

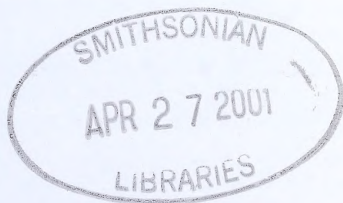
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**TWENTY NEW BUTTERFLIES FROM THE
SOLOMON ISLANDS (LEPIDOPTERA: HESPERIIDAE;
LYCAENIDAE; NYMPHALINAE;
SATYRINAE; DANAINAE)**

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Abstract. Following field work in 1996 and 1997, one new butterfly species, eighteen subspecies and one form are described from the Solomon islands: *Argyronympha danker* sp. n. (Malaita); *Allora doleschallii cristobalensis* ssp. n. (San Cristobal); *Tagiades japetus suumoli* ssp. n. (Ulawa); *Epimastidia arienis taisia* ssp. n. (San Cristobal); *E. a. outgrave* ssp. n. (Malaita); *Anthene paraffinis cristobalus* ssp. n. (San Cristobal); *Anthene lycaenoides orientalis* ssp. n. (Choiseul); *Algiachroa woodfordi malaitae* ssp. n. (Malaita); *Vindula arsinoe intermedia* ssp. n. (Russell Group); *Mynes woodfordi shannoni* ssp. n. (Malaita); *Hypolimnias pithoeka leveri* ssp. n. (Santa Cruz Group); *Cyrestis acilia russellensis* ssp. n. (Russell Group); *Phaedyma fissizonata olega* ssp. n. (Treasury); *Ph. f. philipi* ssp. n. (Ulawa); *Tirumala hamata richardi* ssp. n. (Ulawa); *Danaus affinis monoensis* ssp. n. (Treasury); *D. a. ulawaensis* ssp. n. (Ulawa); *D. a. mendana* ssp. n. (Santa Cruz Group); *Euploea batesii ackeryi* ssp. n. (Ulawa); *Euploea leucostictos* form *roseus* f. n. (Ulawa). Brief notes relating to the status of some other Solomons butterfly taxa are presented and as a result, the name *sapor* Godman & Salvin 1888, is placed in the combination *Vindula arsinoe sapor* stat. n.; *obscura* Ribbe, 1898 syn. n. is synonymised with *sapor*; *Hypolimnias pithoeka salomonis* D'Abrera, 1978 syn. n. is synonymised with nominotypical *pithoeka* Kirsch, 1877, and *Phaedyma viridens* Eliot, 1969 stat. n. is raised to species status.

INTRODUCTION

Despite a colonial history, the numerous islands of the Solomons Archipelago (Map 1) are not well known faunistically. This is particularly so in the case of the butterflies and little systematic collecting has been carried out since the time of Meek and Woodford in the late 19th and early 20th centuries. The author spent eight months in the field in 1996 and 1997, on three separate visits, when many new taxa were discovered (Tennent, 1998; 1999 a-c; 2000 a-c; in press a, b) and numerous data relating to the distribution of butterfly taxa in the Solomons obtained. The aim of the present paper is to make names available for a forthcoming book on the butterflies of the Solomon Islands (Tennent, in prep.).

The following abbreviations are used: The Natural History Museum, London (BMNH); Oxford University Museum, Oxford (OUM); Australian National Insect Collection, CSIRO, Canberra (ANIC); Bernice P. Bishop Museum, Honolulu (BPBM); Dodo Creek Research Station, Honiara (DCRS); forewing length (fwl); upperside (ups); underside (uns); upperside forewing (upf); upperside hindwing (uph); underside forewing (unf); underside hindwing (unh); sea level (sl); type locality (TL).

NEW TAXA

Hesperiidae

Tagiades japetus suumoli ssp. n. (Figs 1, 2, 11, 12)

Description. A large and distinctive race, closer in appearance to *T. j. kazana* Evans, 1934, from Treasury island than to *T. j. hovia* Swinhoe, 1904, which flies in the remainder of the Solomons Archipelago. Male fwl 23 mm; resembles other Solomons races of *T. japetus* Stoll, 1781; larger, fw longer; ups plain brown; upf postdiscal and subapical spots small; uph tornal area with indistinct grey submarginal markings (tornus clear white, variable in extent, in *T. j. hovia*); fringes brown (white in *T. j. hovia*); uns plain brown (darker brown in *T. j. hovia* and *T. j. kazana*); unf postdiscal spots well developed; unh with indistinct grey suffusion extending from inner margin to vein 4 and cell, with distinctive elongated markings in spaces 2 and 3 (less extensive, less elongated in *T. j. kazana*; unh largely white in *T. j. hovia*); genitalia not examined. Female similar.

Distribution. Ulawa.

Type material. HOLOTYPE ♂, Solomon Islands, Ulawa, north coast, Su'umoli village area, SL, 23.iii.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, 1 ♀, same data as holotype; 1 ♀, ditto, 22.iii.1997; 4 ♂♂, Ulawa, Harrina village area, 40 m, 25.iii.1997, W. J. Tennent (all BMNH).

Comment. Whilst geographically not particularly remote, Ulawa is one of the least visited of the Solomon Islands, probably because there is no airstrip, no regular ferry service, and the ocean currents which run between it, Malaita and San Cristobal are strong and dangerous. Considering its small size, it has a high proportion of endemic butterfly taxa at subspecies level, which apparently have closer affinity with fauna of the western islands than with the adjacent islands of Malaita and San Cristobal (Tennent, 1998).

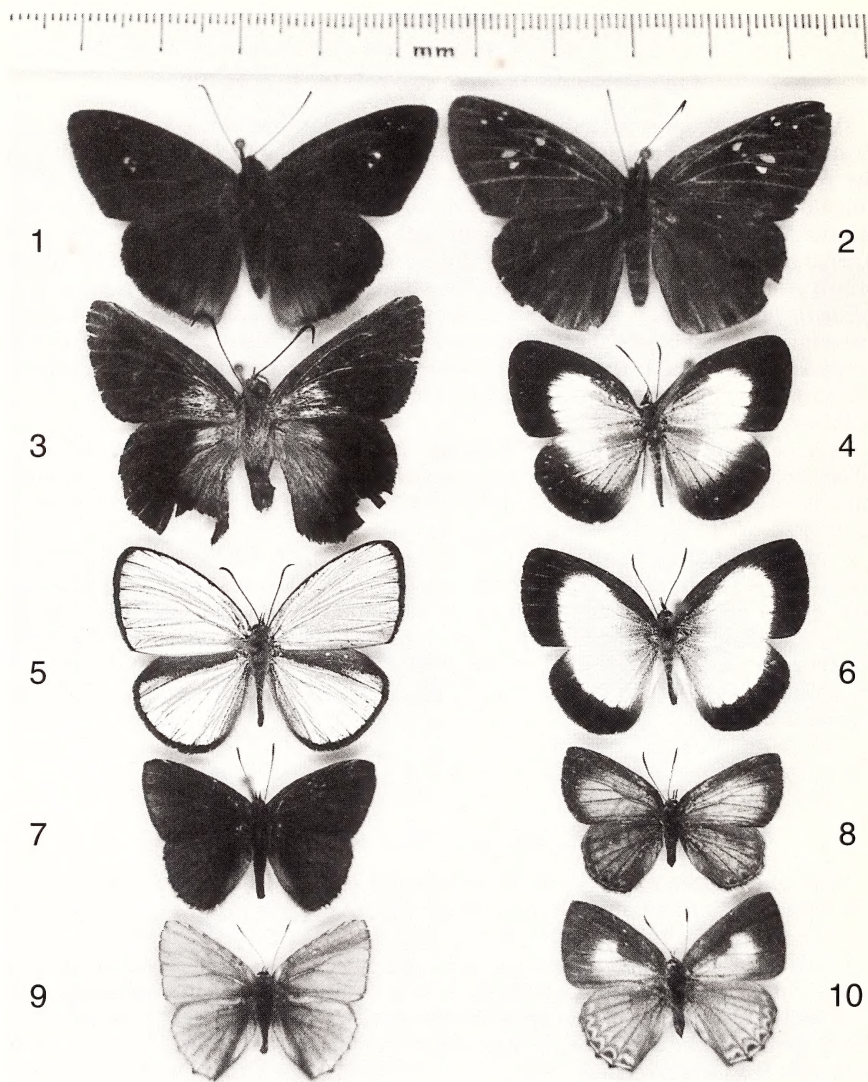
Allora doleschallii cristobalensis ssp. n. (Figs 3, 13)

Description. Similar to other races of *A. doleschallii* C. Felder, 1860. Thorax and ups wing areas blue basally (green or blue-green in *A. d. luna* Evans, 1934 and *A. d. solon* Evans, 1949); uns dark grey-brown (dark brown in *A. d. luna* and *A. d. solon*); unf subapical markings absent on holotype; postmedian and discal markings prominent (slightly less prominent in *A. d. luna*; small or vestigial in *A. d. solon*); unh postbasal spot small, subtornal spot vestigial (well developed in *A. d. luna* and *A. d. solon*); genitalia not examined. Female unknown.

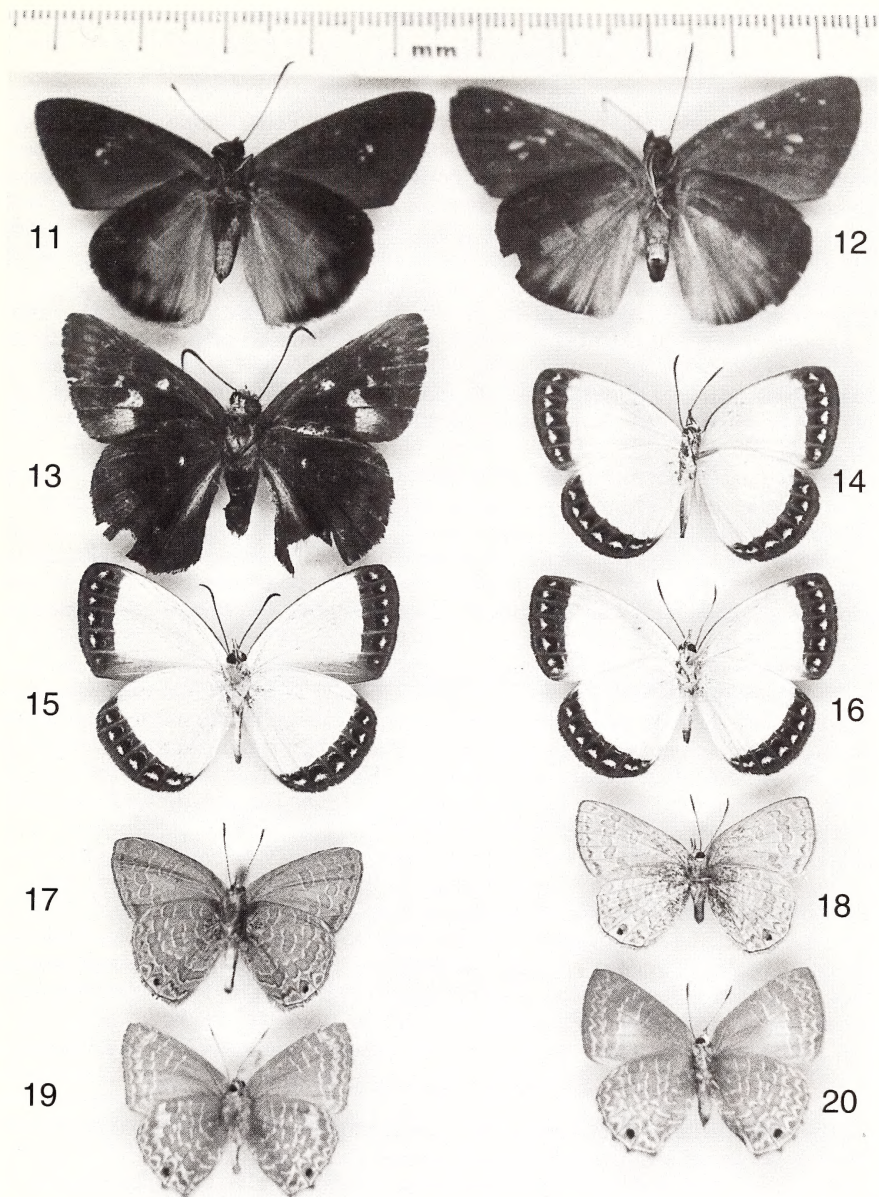
Distribution. San Cristobal.

Type material. HOLOTYPE ♂: Solomon Islands, San Cristobal, above Hauta, 500–700 m, 3.iv.1997, W. J. Tennent (BMNH).

Comment. This is a wary and fast flying species, which is difficult to catch. Although only the holotype was secured, other specimens seen on several visits to San Cristobal were clearly different to *A. doleschallii* races on other Solomon islands. Other than the isolated southern islands of Rennell and Bellona, the large, forested and little-known island of San Cristobal has, together with its satellites, a higher proportion of endemic taxa at both species and subspecies level, than any other island in the Solomons chain (Tennent, 1998). Parsons (1998) spelled the name of this taxon as '*doleschali*', claiming that Evans' (1949) spelling of '*doleschallii*' was incorrect. In fact, Evans was correct (*cf.* Felder, 1860: 460).



Figs 1–10, upperside, 11–20, underside. *Tagiades japetus suumoli* ssp. n. (Ulawa), 1, 11 ♂ holotype; 2, 12 ♀ paratype; *Allora doleschallii cristobalensis* ssp. n. (San Cristobal), 3, 13 ♂ holotype; *Epimastidia arienis outgrabe* ssp. n. (Malaita), 4, 14 ♀ holotype; *Epimastidia arienis taisia* ssp. n. (San Cristobal), 5, 15 ♂ paratype; 6, 16 ♀ holotype; *Anthene paraffinis cristobalus* ssp. n. (San Cristobal), 7, 17 ♂ holotype; 8, 18 paratype; *Anthene lycaenoides orientalis* ssp. n. (Choiseul), 9, 19 ♂ holotype; 10, 20 ♀ paratype.



Figs 11–20. (caption opposite)

Lycaenidae

Epimastidia arienis taisia ssp. n. (Figs 5, 6, 15, 16)

Description. Male fwl 20 mm; virtually indistinguishable from *E. a. arienis* Druce, 1891; uns blue spots in marginal border tend to be slightly darker blue; pale crescent-shaped marks distad to blue spots generally ill-defined; genitalia not examined. Female like *E. a. arienis*; ups marginal borders black (dark brown in *E. a. arienis*); significantly narrower than in *E. a. arienis*, basal margin of border regular, well defined (irregular, slightly diffuse in *E. a. arienis*); basal areas with dark scales, tinged blue, less extensive than *E. a. arienis*; uns borders wider, darker than *E. a. arienis*; submarginal spots small, plain blue (larger, whitish-blue in *E. a. arienis*).

Distribution. San Cristobal

Type material. HOLOTYPE ♀: Solomon Islands, San Cristobal, above Hauta, 5–700 m, 1.iv.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, 1 ♀, same data as holotype; 8 ♂♂, ditto, 3.iv.1997, W. J. Tennent; 2 ♂♂, San Cristobal, Yanuta, 19–29.iv.1908, Meek; 2 ♂♂, San Cristobal [south coast], Makira harbour, 1–9.v.1908, Meek (all BMNH).

Etymology. Named for Ros and Willie Taisia, whose practical advice and assistance was very helpful to the author during several field visits to the Solomons in 1996 and 1997.

Comment. Although *E. arienis* has been known from San Cristobal for many years, only males were previously available. Material obtained in 1997 includes what appear to be the first female specimens collected on that island and are distinctive.

Epimastidia arienis outgrabe ssp. n. (Figs 4, 14)

Description. Female fwl 18 mm; resembles *E. a. arienis*; ups borders broad, black (dark brown in *E. a. arienis*); upf basal area extensively clear pale blue (less extensive, dark brown, obscurely tinged blue in *E. a. arienis*); uph basally blue, extending along inner margin to submarginal border in spaces 1a–2; uns resembles *E. a. taisia*. Male unknown.

Distribution. Malaita.

Type material. HOLOTYPE ♀: Solomon Islands, Malaita, north, above Malu'u, SL-580 m, 24.x.1997, W. J. Tennent (BMNH).

Comment. *E. arienis* is found in a number of races in Australasia. With the exception of the race described here from Malaita, in which the female is partly white and partly blue, Solomons races of *ariensis* have 'white' females, whilst elsewhere (e.g. the Bismarck Archipelago) females are predominantly 'blue' on the ups.

Anthene paraffinis cristobalus ssp. n. (Figs 7, 8, 17, 18)

Description. Male fwl 14 mm; virtually indistinguishable from *A. p. nereia* Tite, 1966; genitalia not examined; female resembles other Solomons races of *A. paraffinis* Fruhstorfer, 1916; ups blue areas purple-blue, extensive (variable in extent in *A. p. paraffinis* and *A. p. nereia*; subdued blue in *A. p. nereia*; silvery-blue in *A. p. paraffinis*); uns colour grey-brown (brown in *A. p. paraffinis* and *A. p. nereia*); arrangement of fine lines less prominent than in *A. p. paraffinis* and *A. p. nereia*.

Distribution. San Cristobal and Ugi.

Type material. HOLOTYPE ♂, Solomon Islands, Ugi, west coast, north of Pawa, SL-60 m, 16.x.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♀, same data as holotype; 5 ♀♀, ditto, 27.iii.1997; 1 ♀, San Cristobal, Kira-Kira, SL, 9.viii.1996, W. J.

Tennent; 1 ♀, ditto, 10.viii.1996; 1 ♀, ditto, 15.viii.1996; 1 ♀, ditto, 16.viii.1996; 1 ♂, 1 ♀, Ugi, G. F. Mathew (paratypes of *A. p. nereia*) (all BMNH).

Comment. There has been confusion in the distribution of races of *A. paraffinis* in New Guinea and the Solomons. Oriental *Anthe* were revised by Tite (1966), who included the Bismarcks, Bougainville, Shortlands, Treasury, Choiseul and islands of the New Georgia Group in the distribution of *A. p. paraffinis* (Tite, 1966: 264). He went on to describe (Tite, 1966: 266) *A. p. nereia* from Guadalcanal, the Florida Group, Malaita and Ugi. Localities for *nereia* included "Gela (= Guadalcanal), Florida and Tulagi". In fact Gela, or Nggela, is an early name for what is now more usually called Florida, and Tulagi, the pre-second world war Solomons capital, is a small island off the southwest coast of the main island of Florida. Tite gave (1966: 266) 'v.1891' and 'iv.1891' for date of capture of the *nereia* holotype and allotype respectively; they were taken by Meek in 1901.

Parsons (1998: 415) reported both *A. p. paraffinis* and *A. p. nereia* from New Guinea, and included the Bismarcks in the distribution of the former and Bougainville in the distribution of the latter. D'Abrera (1990: 359), gave Gizo, a small island of the New Georgia Group, as a locality for both *A. p. paraffinis* and *A. p. nereia*. Tite acknowledged that *nereia* was very similar to nominotypical *paraffinis* in both sexes, and provided a series of differences which were said to separate the two, some of which appear to relate to individual variation in this species. Examination of available material, including fresh material obtained during field work in 1996 and 1997, suggests that Tite was correct in restricting *nereia* to Guadalcanal, Florida and Malaita. Specimens from the Russell group, west of Guadalcanal, also appear to be referable to this race. Material from other islands north and west of Guadalcanal, including Santa Isabel and Choiseul, is referable to *A. p. paraffinis* and one might reasonably expect Bougainville populations also to be nominotypical. The known distribution of *A. paraffinis* in the Solomons Archipelago accords closely with what is known of the biogeography of the region (Tennent, 1998).

Anthe lycaenoides orientalis ssp. n. (Figs 9, 10, 19, 20)

Description. Male fwl 13mm; similar to *A. l. sutrana* Fruhstorfer, 1916 (New Guinea); smaller, ups less purple; hw margin less scalloped at tornus; uns grey-brown (brown in *A. l. sutrana*); fine lines prominent (more subdued in *A. l. sutrana*); unf submarginal and postmedian lines close together (separated in *A. l. sutrana*); unh postmedian markings large, 'blotched' towards costa; genitalia not examined. Female ups like *A. l. sutrana*; upf white discal patch smaller, less clearly defined; basal scales silver-blue (mauve-blue in *A. l. sutrana*); uph pale suffusion more extensive; uns markings more conspicuous; unf usually with pale discal patch, often obscure and occasionally absent (always well developed, may be enlarged to form median band in *A. l. sutrana*).

Distribution. Choiseul. Possibly also Bougainville (see comment, below).

Type material. HOLOTYPE ♂: Solomon Islands, Choiseul, 3–6 km north of Mole, 40–120 m, 16.iv.1997, W. J. Tennent (BMNH); PARATYPES: 2 ♂♂, 10 ♀♀, same data as holotype; 2 ♀♀, ditto, 17.xi.1997; 3 ♀♀, ditto, 18.xi.1997; 2 ♀♀, ditto, 22.xi.1997 (all BMNH).

Comment. Parsons (1998: 414) reported a "distinctive unnamed race" of *A. lycaenoides* C. Felder, 1860 in the ANIC taken by Brandt at Kieta on Bougainville. These specimens have not been examined by the present author, but geographical proximity of the localities, together with known biogeographical distribution of butterfly taxa in the Solomons Archipelago, suggests that this material is probably

also referable to *A. l. orientalis*. Discovery of this butterfly on Choiseul extends the known range of *A. lycaenoides* eastwards.

Nymphalinae

Algiachroa woodfordi malaitae ssp. n. (Figs 21, 27)

Description. Male fwl 34 mm; closely resembles *A. w. woodfordi* Godman & Salvin, 1888; upf white median band broad, markings in spaces 3–5 extended, making distal edge convex (band narrow, straight in all *A. w. woodfordi* examined); black median spot in space 1b large; holotype with second, smaller, spot in space 2 (not present in paratype, or in any *A. w. woodfordi* seen); uph like *A. w. woodfordi*, unf median band like ups; postmedian irregular dark-brown band narrow anteriorly (broader in *A. w. woodfordi*); genitalia not examined. Female unknown.

Distribution. Malaita.

Type material. HOLOTYPE ♂: Malaita, north, above Malu'u, SL-580 m, 24.x.1997, W. J. Tennent (BMNH); PARATYPE ♂: Malaita, Cape Astrolabe, 24.xi.1944, R. Shannon (BMNH).

Comment. The author is most grateful to Ray Shannon of Auckland, New Zealand, for making the paratype specimen of this taxon available for study, and for kindly agreeing to deposit it in the BMNH.

Vindula arsinoe intermedia ssp. n. (Figs 23, 24, 29, 30)

Description. Male fwl 46 mm; resembles *V. arsinoe sapor* Godman & Salvin, 1888 (see comments, below); upf brown, black linear markings light, particularly submarginal and subapical lines (heavier in *V. a. sapor*); uph white submarginal markings in spaces 2, 3 and 4 clear white, reduced (more extensive, with that in space 4 often partly obscured by fuscous suffusion in *V. a. sapor*); submarginal line broken into series of markings, weakly chevron shaped (more angular in *V. a. sapor*); mark in space 2 bar-like or weakly rounded basad (sharply angular in *V. a. sapor*); uns like *V. a. sapor*; genitalia not examined. Female resembles *V. a. clodia* (Godman & Salvin, 1888 from Ulawa island (the male of this race lacks ups white markings); hw tail at vein 3 short (longer in *V. a. clodia*).

Distribution. The Russell Group. Reported from Mbanika (Yandina) and Pavuvu islands; seen but not collected on Mane (Tennent, pers. obs.).

Type material. HOLOTYPE ♂: Solomon Islands, Russell Group, Pavuvu Island, SL-80 m, 27.x.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, Russell Group, Mbanika Island, Yandina, SL, 29.x.1997, W. J. Tennent; 1 ♀, Russell Group, Pavuvu Island (west), Losilen village to Pavuvu Hill, SL-200 m, 28.x.1997 (all BMNH); 1 ♀, Russell Group, [Mbanika Island], Yandina, 18.i.1964; 1 ♀, ditto, 19.i.1964; 1 ♀, Russell Group, Pavuvu Island, 18.vii.1964; 1 ♂, 1 ♀, ditto, 19.vii.1964; 2 ♂♂, Russell Group, Banika [Mbanika] Island, 23.vii.1964; 1 ♂, 2 ♀♀, ditto, 24.vii.1964; 1 ♂, 1 ♀, ditto, 26.vii.1964; 3 ♂♂, 4 ♀♀, ditto, 27.vii.1964 (BPBM).

Comments. The status and distribution of Solomons races of *V. arsinoe* Cramer, 1777, a large nymphalid butterfly which occurs in a variety of well-defined races from India through south-east Asia to the Moluccas, Australia, New Guinea, the Bismarck Archipelago and the Solomon Islands, has been fundamentally confused by D'Abrera (1971, 1978, 1990).

Godman & Salvin (1888: 95–96) described *sapor* (TL: Alu [Shortland Group]), *catenes* (TL: Santa Ana [a satellite of San Cristobal]) and *clodia* (TL: Ulawa) as distinct species, whilst acknowledging their close affinity. More recently (Fruhstorfer,

[in Seitz] 1912; Talbot, 1932; D'Abrera, 1990), *catenes* and *clodia* have been regarded as subspecies of *arsinoe*, whilst *sapor* has been accorded species status, based on the white markings of the male uph and on minor differences in the early stages. Talbot (1932: 160) described *sapor albosignata* from Ranongga in the New Georgia Group. D'Abrera (1990: 204), partly paraphrasing Fruhstorfer (in Seitz, 1912) but with some confusing additional comments, recognised *arsinoe catenes* (Santa Ana), *arsinoe clodia* (Ulana [sic]), *sapor sapor* (Guadalcanal, Arawa and Choiseul), *sapor obscura* (Bougainville and Shortlands), and *sapor albosignata* ('Ranonga'), as occurring in the Solomon Islands. Parsons (1998: 624) also recognised *sapor* as a distinct species and followed D'Abrera in reporting the distribution of *sapor obscura* as Bougainville (politically part of Papua New Guinea, but geographically part of the Solomons Archipelago) and the Shortlands.

Detailed correction of D'Abrera (1990: 204) regarding Solomons *Vindula* taxa is beyond the scope of this paper. Suffice it to say here that the holotype of *sapor* is from Alu and that the type locality of *obscura* Ribbe, 1898, is the Shortlands. Alu is the largest of the Shortlands, often referred to locally simply as 'Shortland', and *obscura* Ribbe syn. n. is synonymous with *sapor* Godman & Salvin. Arawa (a D'Abrera locality for '*sapor sapor*') is a settlement on Bougainville (a D'Abrera locality for *sapor obscura*). The illustration said to be a female *sapor obscura* (D'Abrera, 1990: [205]), is a typical female of the highly distinctive race *albosignata* from New Georgia.

Whether or not *sapor* should properly be regarded as a species or as a race of *V. arsinoe* is open to question. Geographically (see Map 2), a distribution of *sapor* races (*sapor*, *intermedia* and *albosignata*) from Bougainville to Guadalcanal and Malaita, with a disjunct distribution of *arsinoe* races to the west (New Guinea etc.) and to the east (*clodia* and *catenes*), seems unlikely. Perceived differences between *arsinoe* and *sapor* appear sufficiently minor to place the latter as a subspecies of the former (*Vindula arsinoe sapor* stat. n.).

The easternmost representative of *V. arsinoe* is *V. a. catenes*, which occurs on the island of San Cristobal and its satellites although there is an unconfirmed report from Vanuatu. Samson spent two months, from January to March 1983, studying butterflies in Vanuatu, primarily on Efate and reported (Samson, 1983: 4) seeing males of an [unidentified] *Vindula* species on that island in a garden between Vila and Pango and saw one specimen sufficiently closely to observe that it lacked the white patches typical of *sapor* (Samson, pers. comm.). Distribution of Solomons races of *V. arsinoe* is shown on Map 2.

Mynes woodfordi shannoni ssp. n. (Figs 22, 28)

Description. Male fwl 28 mm; resembles other Solomons races of *M. woodfordi* Godman & Salvin, 1888; upf basal half creamy-white, extending almost to costa, uninterrupted basally or at inner margin (in other Solomons races, always with black border at costa; interrupted basally (variable)); subapical and marginal white markings inconspicuous; uph creamy white patch extensive; unlf basal half white, with small elongate black basal mark (reduced and usually broken, or with more extensive basal black mark in other Solomons races); unh pale median patch large, extending to inner margin (unbroken in two specimens seen, thinly broken along submedian vein in a third) (distinctly broken into two separate marks by submedian vein in other Solomons races); genitalia not examined. Female not known.

Distribution. Malaita.

Type material. HOLOTYPE ♂: Solomon Islands, Malaita, north, Cape Astrolabe, 22.x.1944, R. Shannon (BMNH); PARATYPES: 1 ♂, Malaita, Auki to Fiu river,

SL-200 m, 25.x.1997, W. J. Tennent (BMNH); 1 ♂, Malaita, Tangtalau-Kuala, 24.ix.1957 (BPBM).

Etymology. Named for Mr Ray Shannon, of Auckland, New Zealand, who collected the holotype of this taxon whilst serving on Malaita during the Second World War, and kindly donated it to the BMNH.

***Hypolimnias pithoeka leveri* ssp. n. (Figs 25, 26, 31, 32)**

Description. Small, male fwl 34 mm (36–50 mm in *H. p. pithoeka* Kirsch, 1877); upf white postmedian spots absent (variable, but rarely completely absent in *H. p. pithoeka*); uph with pale golden broad submarginal band containing series of postmedian white-pupilled black spots (plain, but band paler and generally obscure when present in *H. p. pithoeka* [but see comment, below]); unf postmedian white spots complete; unh submarginal band like ups, paler; genitalia not examined. Female small, fwl 38 mm (41–52 mm in *H. p. pithoeka*); ups postmedian spots well developed; upf apex with patch of white scales in spaces 7 and 8 (plain, or with discrete spots in *H. p. pithoeka*); uns similar.

Distribution. Santa Cruz Group. Reported from Ndeni and Vanikoro.

Type material. HOLOTYPE ♂: Solomon Islands, Santa Cruz Group, Ndeni Island, 5–8 km south of Lata, 160 m, 13.x.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♀, same data as holotype; 1 ♀, Santa Cruz Group, Ndeni Island, 0–5 km south of Lata, 60–160 m, 10.x.1997, W. J. Tennent; 1 ♀, ditto, 11.x.1997 (all BMNH); 1 ♂, Santa Cruz Group, Vanikoro Island, v.–vi.1933, R. A. Lever (OUM).

Etymology. This taxon is named in recognition of the late R. A. Lever, who collected and studied Solomon Islands butterflies and whose material, in the BMNH and OUM collections, has been of great assistance in current studies.

Comment. *H. pithoeka* closely resembles the resident ‘brown’ *Euploea* species and *D. affinis* (both Danainae) on different Solomon Islands, including the remarkable white-bordered mimetic assemblages of San Cristobal and Malaita. The Santa Cruz Group is no exception and *H. p. leveri* is approximately two thirds of the size of *pithoeka* elsewhere in the Solomons; both sexes are effective mimics of the Santa Cruz *Euploea* species. Gross (1975: 418) reported *pithoeka* from Vanuatu. Samson (1979: 11) mentioned nominotypical *pithoeka* from the Solomons (excluding Rennell and Bellona), including the Santa Cruz Group and from Vanuatu. Later (Samson, 1983: 4) he recorded a *pithoeka* ‘subsp.’ from Vanuatu. No specimens from Vanuatu have been available for examination and it is possible that Vanuatu populations are referable to this taxon.

D’Abrera’s treatment (D’Abrera, 1978, 1990) of *H. pithoeka* in the New Guinea region was muddled. In addition to overlooking a number of well-defined subspecies (Parsons, 1998: 610), no account was taken of the long series of *pithoeka* from the Solomon Islands in the BMNH when raising the name *salomonis* for *pithoeka* from Guadalcanal (D’Abrera, 1978: 219). Brief diagnostic features, including perceived differences in wing shape, given for separation of *salomonis* D’Abrera syn. n. fall within the range of nominotypical *H. pithoeka*. The male holotype of ‘*salomonis*’ illustrated (D’Abrera, 1978; 1990: 219) is *f. illuminata* Fruhstorfer, which may occur in any Solomons population.

***Cyrestis acilia russellensis* ssp. n. (Figs 33, 34, 41, 42)**

Description. Holotype male fwl 25 mm (a second male is 31 mm); closely resembles other Solomons races of *C. acilia* Godart, 1819; in general appearance intermediate

between *C. a. ulawana* Martin, 1903 (Ulawa) and *C. a. nitida* Mathew, 1887 (the remainder of the Solomons except San Cristobal); on both surfaces fw white median band straight, of equal width from costa to inner margin (generally wider, significantly wider at inner margin than at costa in *C. a. nitida*; very narrow, often obscured at costa in *C. a. ulawana*; very wide, 'bent' near costa in *C. a. solomonis* Mathew, 1887); other markings variable, typical of *C. acilia*; genitalia not examined. Female like male; basal edge of median white line ill-defined in two of three females seen.

Distribution. The Russell Group.

Type material. HOLOTYPE ♂: Solomon Islands, Russell Group, Mane Island, SL-80 m, 28.x.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, 1 ♀, Russell Group, Pavuvu Island, SL-80 m, 27.x.1997, W. J. Tennent; 1 ♀, Russell Group, Pavuvu Island (west), Losilen village to Pavuvu Hill, SL-200 m, 28.x.1997, W. J. Tennent; 1 ♀, Russell Group, Marulaon Island, SL-40 m, 27.x.1997, W. J. Tennent (all BMNH).

Comment. Situated 40 km west of Guadalcanal and 90 km east of the New Georgia Group, the Russells are a compact group of small islands which have been little studied, probably due to the fact that with the exception of much of central Pavuvu, the islands have been largely given over to the commercial production of coconuts. Russells populations of most butterfly species are identical to those on the large island of Guadalcanal to the east, although recent studies have shown that populations of some widespread species in addition to *Cyrestis acilia* (*Vindula arsinoe*) and *Mycalesis splendens* Mathew, 1887) have evolved distinct races on the Russells.

***Phaedyra fissizonata olega* ssp. n. (Figs 35, 36, 43, 44)**

Description. Male fwl 32 mm; resembles other Solomons races of *Ph. fissizonata* Butler, 1882; closest to *Ph. f. pisias* Godman & Salvin, 1888; uph median markings small, forming narrow band (markings consistently larger, forming wider band, in *Ph. f. pisias*); uph submarginal pale markings obscure, suffused with dark scales (obscure or with vestigial white spots in spaces 5 & 6 in *Ph. f. pisias* [variable]; usually with complete series of obscure white spots in *Ph. f. vella* Eliot, 1969 [variable]; full series of prominent white spots in *Ph. f. fissizonata*); genitalia typical of *Ph. fissizonata* (see *Ph. f. philipi*, Fig. 73). Female similar.

Distribution. Treasury Island.

Type material. HOLOTYPE ♂, Solomon Islands, Treasury Group, Mono Island, SL-40 m, 1.xii.1997, W. J. Tennent (BMNH); PARATYPES: 2 ♂♂, 2 ♀♀, same data as holotype (inc. gen. prep. BMNH (V) 5153); 1 ♂, 2 ♀♀, Treasury Group, Stirling Island, SL-40 m, 30.xi.1997, W. J. Tennent; 1 ♂, Treasury, G. F. Mathew; 1 ♀, Treasury, 5–10.viii.1901, Meek; 1 ♀, ditto, 9.viii.1901 (all BMNH).

Etymology. Named for Queensland Olega, who provided the author with hospitality on Treasury Island, in recognition of his efforts for eco-tourism, despite the difficulties of local transport and the relative remoteness of his home.

Comment. Based on limited material in the BMNH, Eliot (1969: 129) remarked on some minor observed differences in submarginal markings between *Ph. fissizonata* populations from Treasury Island and those from the range of *Ph. f. pisias*. Further material has established that the latter are variable, but that constant differences separate Treasury populations from the other Solomons races. See also comments under *Ph. f. philipi* ssp. n. (below).



Figs 21–26, upperside, 27–32, underside. *Algiachroa woodfordi malaitae* ssp. n. (Malaita), 21, 27 ♂ holotype; *Mynes woodfordi shannoni* ssp. n. (Malaita), 22, 28 ♂ holotype; *Vindula arsinoe intermedia* ssp. n. (Russell Group), 23, 29 ♂ holotype; 24, 30 ♀ paratype; *Hypolimnastis pithoeke leverii* ssp. n. (Santa Cruz Group), 25, 31 ♂ holotype; 26, 32 ♀ paratype;

***Phaedymanassa fissizonata philipi* ssp. n. (Figs 37, 38, 45, 46, 73)**

Description. Male fwl 30 mm; uph median markings of average width in comparison to other Solomons races of *Ph. fissizonata*, but with those in spaces 1a and 1b, adjacent to inner margin, severely constricted, sometimes vestigial (some Treasury specimens are intermediate between this and other Solomons races; not seen in any of several hundred individuals of other Solomons races examined); uph submarginal pale markings obscure (in three ♂♂ examined); genitalia (Fig. 73) like typical *fissizonata*. Female similar; ups submarginal markings variable, but usually present.

Distribution. Ulawa.

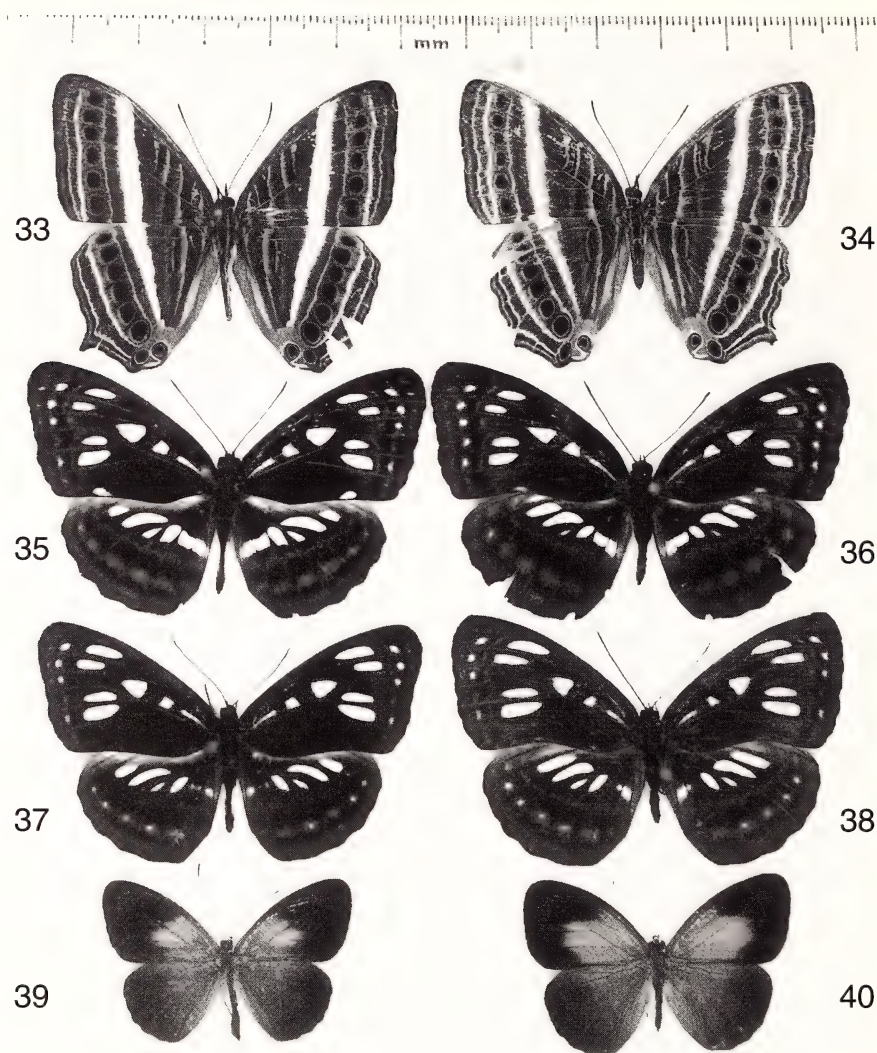


Figs 27–32 (caption opposite).

Type material. HOLOTYPE ♂: Solomon Islands, Ulawa, north, Kellmei and Harrina village areas, SL-40 m, 24.iii.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, 2 ♀♀, same data as holotype; 1 ♂, 2 ♀♀, Ulawa, north, Su'umoli village area, SL, 23.iii.1997, W. J. Tennent (BMNH (V) 5152); 2 ♀♀, ditto, 22.iii.1997 (all BMNH).

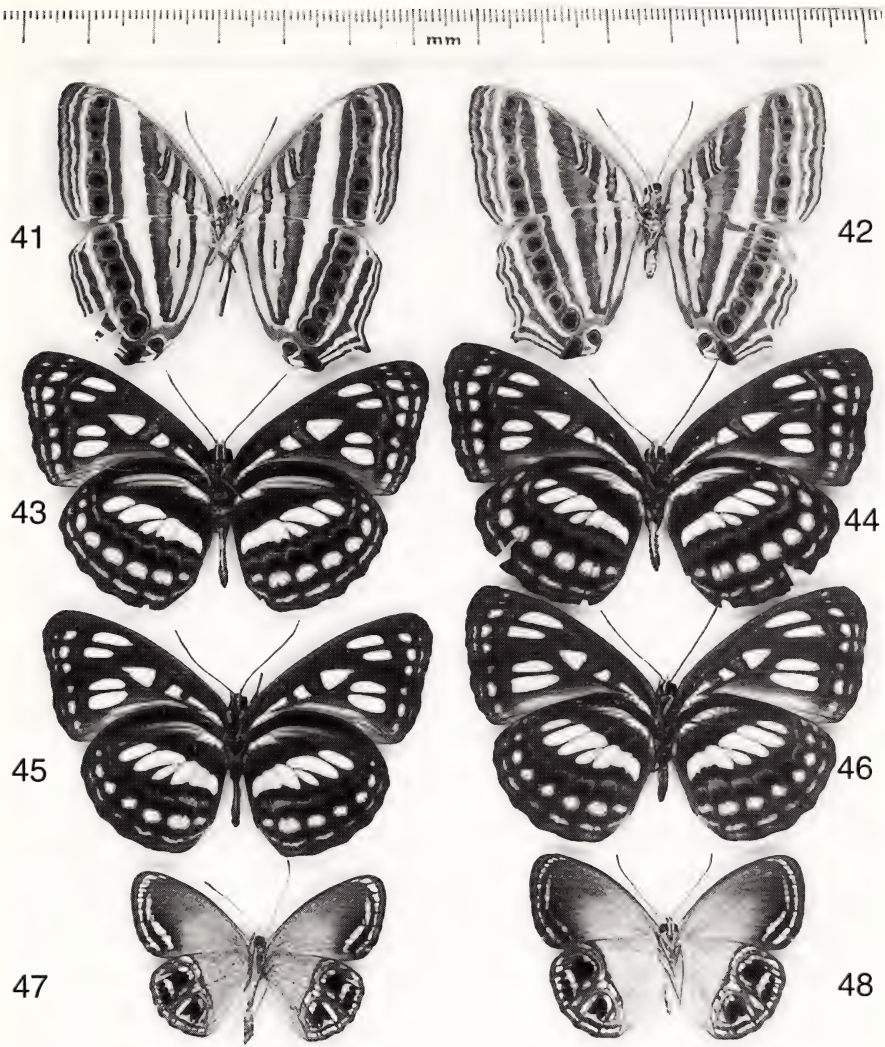
Etymology. Named for Philip Paewane and his brother Alex Pwahe, without whose hospitality, courtesy and practical assistance, the author would have experienced difficulty in carrying out field work on Ulawa.

Comment. The Solomons *fissizonata* taxa were examined by Eliot (1969) who raised two new names (*vella* and *viridens*) and several questions. Long series collected on different islands in 1996 and 1997 confirm Eliot's views in almost all regards. It was thought that white and green forms might be seasonal, and there may indeed be a seasonal element in some populations, for example on Guadalcanal, where all individuals seen were white in July and August 1996 and



Figs 33–40, upperside, 41–48, underside. *Cyrestis acilia russellensis* ssp. n. (Russell Group), 33, 41 ♂ holotype; 34, 42 ♀ paratype; *Phaedyra fissizonata olega* ssp. n. (Treasury), 35, 43 ♂ holotype; 36, 44 ♀ paratype; *Ph. f. philipi* ssp. n. (Ulawu), 37, 45 ♂ holotype; 38, 46 ♀ paratype; *Argyronympha danker* sp. n. (Malaita), 39, 47 ♂ holotype; 40, 48 ♀ paratype.

mostly pale green in October 1996 and April 1997. In general however, colour forms are not seasonal in any clear cut sense and white and green forms may occur together in all populations. Presence of a greenish tinge is not geographically or seasonally consistent in other *Phaedyra* species, e.g. *P. sheperdi* Moore, 1858 (Dunn & Dunn, 1991: 559).



Figs 41–48 (caption opposite).

The name *vella* was raised by Eliot (1969: 129) to describe specimens from Vella Lavella, Ranongga and Gizo. He went on to say that examples from New Georgia and Rendova showed some affinity with *pisias* but that they were “nearer to ssp. *vella* under which they are provisionally placed”. Experience with other butterfly taxa suggests it would be unusual for different races of the same widespread species to fly on different islands of the New Georgia Group, and further material obtained

recently suggests that diagnostic features described by Eliot in raising the name *vella* hold true for *fissizonata* on all islands of the New Georgia Group from which material is available.

Prior to field work in 1996 and 1997, when a short series of both sexes were collected, the San Cristobal taxon *viridens* was known only from two females. In raising the name *viridens* as a ssp. of *fissizonata*, Eliot (1969: 130) suggested it may be worthy of species rank. Significant differences in phenotype, adult behaviour (Tennent, in prep.) and genitalia between *viridens* and *fissizonata* occurring in the remainder of the Solomons support this view and, as a result, *Ph. viridens* stat. n. is here raised to species status. No white form of *Ph. viridens* has been seen. Eliot (1969: 147) illustrated the valves of several *Phaedyra* species, not including *Ph. fissizonata* and so far as is known, genitalia of Solomons *Phaedyra* have not been illustrated elsewhere. The genitalia of *Ph. fissizonata philipi* (Fig. 73) are typical of the genus and there is little or no variation between *fissizonata* races. The genitalia of male *viridens* (Fig. 74) differ from *fissizonata* in several significant respects, including the tegumen (posterior of tegumen angular, squat in *Ph. fissizonata*; more rounded in *Ph. viridens*), saccus (slim with sharp angle dorsally in *Ph. fissizonata*; more bulky, not angled dorsally in *Ph. viridens*) and valve (longer in *Ph. fissizonata* than in *Ph. viridens*).

Eliot also said (1969: 130) "There are no examples in the BMNH from the large and little-known island of Malaita; it is conceivable that a form linking *viridens* with the other subspecies may be found there". Malaitan *Ph. fissizonata* is nominotypical.

Satyrinae

Argyronympha danker sp. n. (Figs 39, 40, 47, 48, 77)

Description. Male fwl 20 mm; fw narrow; ups resembles *A. gracilipes* Jordan, 1924 (Guadalcanal and Florida); basal orange colour orange-yellow (dull orange in *A. gracilipes*); uns resembles *A. rubianensis* Grose-Smith, 1889 (New Georgia Group) in colour and pattern; the shape of the yellow unh postmedian bars contained within large black areas in spaces 2–3 (posterior) and 5–6 (anterior), part of a complex arrangement of orange, black and iridescent silver markings, is diagnostic in all species of *Argyronympha*. In *danker*, the anterior bar is long, rounded basally, prominently serrated distally (shorter, squat, occasionally weakly serrated distally in *A. rubianensis*; with deep double chevron basally in *A. gracilipes*); posterior bar thin, extending basad in space 3 (more prominent, thickened in space 3 in *A. rubianensis*); genitalia (Fig. 77) typical of *Argyronympha*; valve and uncus long, slender, pseuduncus strongly curved, with single, 'hooked' lobe posteriorly (not strongly curved, with three irregular lobes in *A. rubianensis* (Fig. 75) and *A. gracilipes* (Fig. 76)); aedeagus long, deeply curved (shorter, curve shallow in *A. rubianensis* and *A. gracilipes*). Female like male; basal orange more extensive (reduced in *A. gracilipes*); uns like male.

Distribution. Malaita.

Type material. HOLOTYPE ♂: Solomon Islands, Malaita, north, above Malu'u, SL-580 m, 24.x.1997, W. J. Tennent (BMNH); PARATYPES: 3 ♂♂, 4 ♀♀, same data as holotype; 5 ♂♂, 4 ♀♀, Malaita, Auki to Fiu river, SL-200 m, 11.iv.1997, W. J. Tennent; 4 ♂♂, 1 ♀, ditto, 22.x.1997 (all BMNH); 2 ♂♂, 1 ♀, Malaita, Tangtalau to Kwalo, 24.ix.1957; 1 ♀, Malaita, Tangtalau, 26.ix.1957; 1 ♂, 1 ♀, Malaita, Dala, 6.vi.1964; 1 ♂, ditto, 11.vi.1964; 2 ♂♂, 1 ♀, ditto, 50 m, 22.vi.1964, J. & M. Sedlacek;

3 ♂♂, 6 ♀♀, ditto, 7–22.vi.1964; 2 ♀♀, Malaita, Andalima to Ngarafata, near Fiu river, no date (all BPBM).

Comment. There is no published record of any *Argyronympha* species from Malaita, aside from that of D'Abrera (1990: 268), who included "Malaita (?)" in the distribution of *A. ulava* Grose-Smith, 1889, the *Argyronympha* species endemic to Ulawa. No recent illustration of the large and distinctive *A. ulava* is extant, and this may explain why the few Malaitan *Argyronympha* in collections in Honiara (DCRS), Canberra (ANIC) and Hawaii (BPBM), have tentatively been labelled as *ulava*. *A. danker* is common on Malaita.

Danainae

Tirumala hamata richardi ssp. n. (Figs 61, 62, 67, 68)

Description. Male fwl 42 mm; like other races of *T. hamata* Macleay, 1827, but with markings significantly reduced; upf marginal and submarginal series of spots reduced in size and number (variable: absent in holotype); uph marginal series absent or vestigial (small, but usually present in *T. h. obscurata* Butler, 1874; prominent in *T. h. insignis* Talbot, 1943); submarginal series small, often incomplete (small, complete in *T. h. obscurata*; extensive, lozenge-shaped in *T. h. insignis*); uns markings like other *hamata* races; markings reduced in size and number; genitalia not examined. Female similar.

Distribution. Ulawa.

Type material. HOLOTYPE ♂: Solomon Islands, Ulawa, north, Harrina village area, 40 m, 25.iii.1997, W. J. Tennent (BMNH). Paratypes: 2 ♀♀, same data as holotype; 2 ♂♂, 2 ♀♀, Ulawa, north, Su'umoli, SL, 22.iii.1997; 1 ♂, 1 ♀, Ulawa, north, Kellmei and Harrina village areas, SL-40 m, 24.iii.1997; 1 ♂, 1 ♀, Ulawa, Woodford (all BMNH).

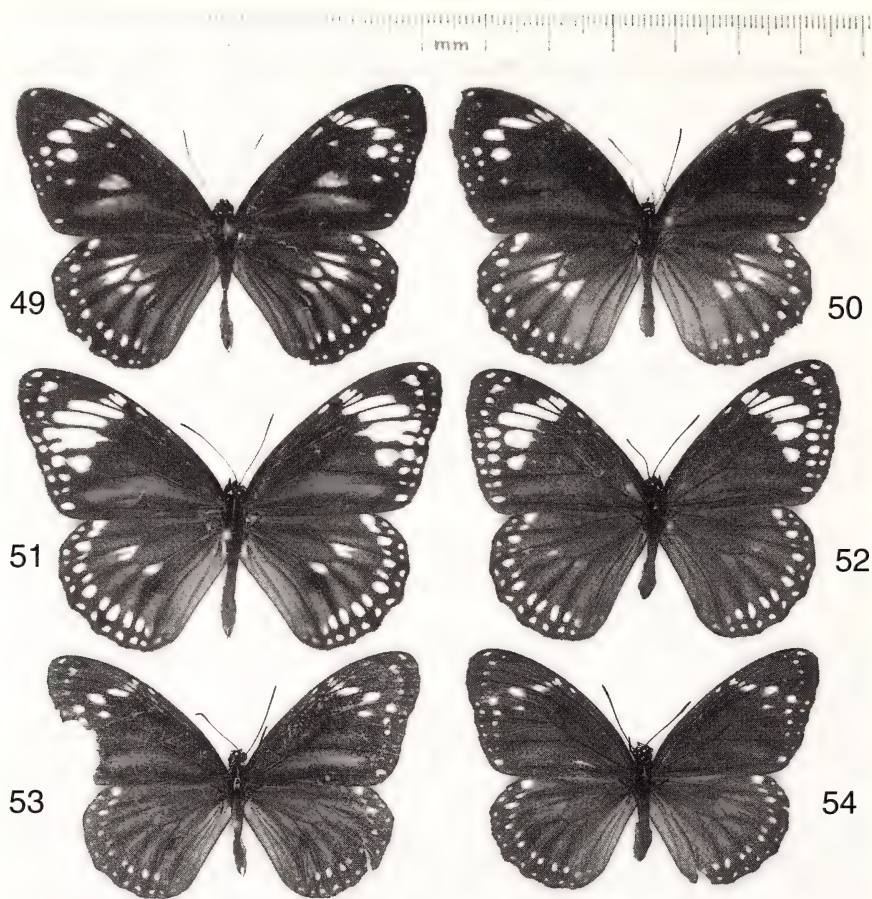
Etymology. This distinctive taxon is named for Dick Vane-Wright, world authority on danaine butterflies, whose practical support and encouragement for the author's Solomons butterfly research has been unwavering.

Comment. It is interesting that, in the Solomons, the race with the most developed markings (*T. h. insignis*—Malaita) and that with the least developed markings (*T. h. richardi*—Ulawa), fly on islands only 45 km apart.

Danaus affinis monoensis ssp. n. (Figs 49, 50, 55, 56)

Description. Male fwl 36 mm; superficially similar to other Solomons races of *D. affinis* Fabricius, 1775 (see below); dissimilar to the widespread *D. a. decipiens* Butler, 1882, which flies throughout the western Solomons; closest in appearance to populations from Ulawa (see *D. a. ulawaensis* ssp. n., below); ups dull orange-brown, with outer two-thirds of fw, all wing margins and veins suffused black; upf subapical white markings well developed (vestigial in *D. a. decipiens*); upf marginal and submarginal white spots small, series incomplete; uph marginal and submarginal white spots prominent, series complete (small, series incomplete in *D. a. decipiens*); median white markings large, well developed, extending to cell (small, not extending to cell in *D. a. decipiens*); uns markings similar to ups; genitalia not examined. Female similar.

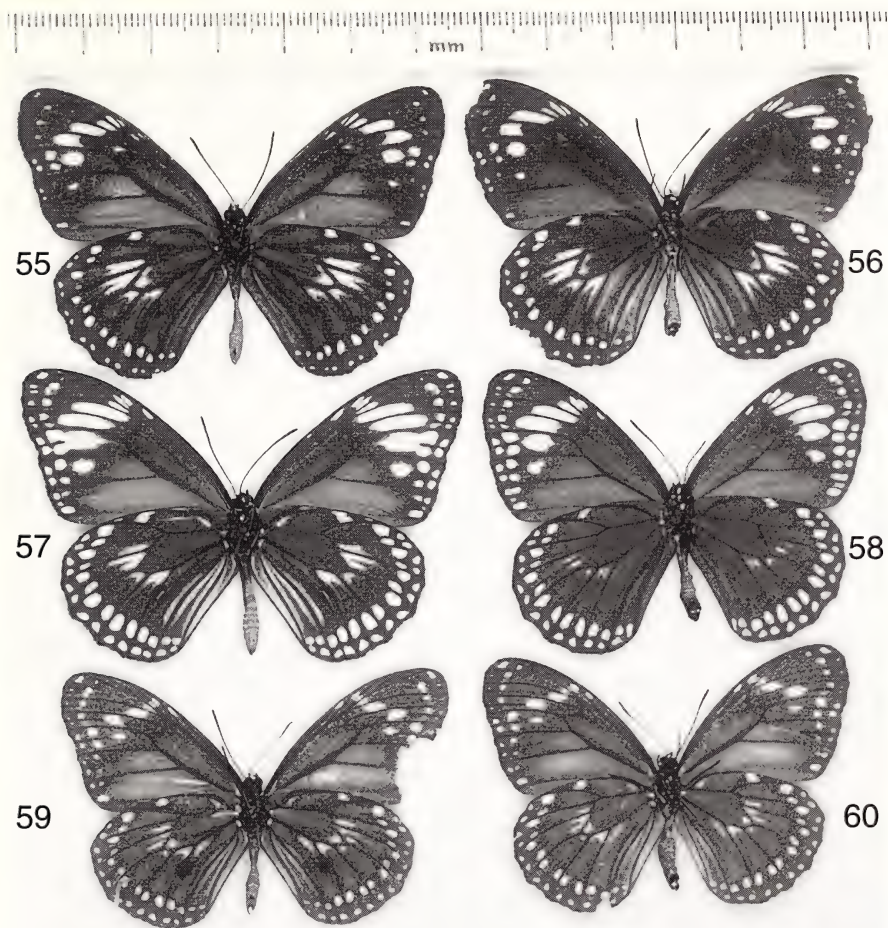
Distribution. Treasury Island.



Figs 49–54, upperside, 55–60, underside. *Danaus affinis monoensis* ssp. n. (Treasury), 49, 55 ♂ holotype; 50, 56 ♀ paratype; *D. a. ulawaensis* ssp. n. (Ulawa), 51, 57 ♂ holotype; 52, 58 ♀ paratype; *D. a. mendana* ssp. n. (Santa Cruz Group), 53, 59 ♂ holotype; 54, 60 ♀ paratype.

Type material. HOLOTYPE ♂; Solomon Islands, Treasury Group, Stirling Island, SL-40 m, 2.xii.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♂, 1 ♀, same data, 30.xi.1997 (both BMNH).

Comment. Despite its small size, remote Treasury is home to a number of interesting butterfly taxa. At species level it is not known to have any endemic butterflies (with the possible exception of a recently described *Arhopala* species [Tennent, 1999a]), but the fauna includes several distinctive endemic subspecies (Tennent, 1998). *D. a. decipiens* was reported from Treasury Island by Ackery & Vane-Wright (1984: 150) but the specimen(s) on which this was based have not been located. Two males and a female taken on Treasury in 1997 are quite different from



Figs. 55–60 (caption opposite).

decipiens, which flies to the north (Shortlands), north-east (Choiseul) and east (New Georgia Group) of Treasury. See also notes under *D. a. mendana* ssp. n. (below).

***Danaus affinis ulawaensis* ssp. n. (Figs 51, 52, 57, 58)**

Description. Male fwl 38 mm; resembles other Solomons *affinis* races, including *D. a. monoensis* ssp. n. (Treasury, see above) and, particularly, *D. a. albonotata* Howarth, 1962 (Rennell). Ups marginal and submarginal white spots large, prominent; upf subapical white markings prominent, with tendency to streak; uph median white markings absent in most individuals seen, vestigial in some (more prominent in *D. a. monoensis* and *D. a. albonotata*); uns similar markings; genitalia

not examined. Female similar; one female paratype has upf white median markings in spaces 1b and 2, and extensive hw median white markings.

Distribution. Ulawa.

Type material. HOLOTYPE ♂: Solomon Islands, Ulawa, Su'umoli, SL, 22.iii.1997, W. J. Tennent (BMNH); PARATYPES: 5 ♂♂, 3 ♀♀, same data as holotype; 2 ♂♂, Ulawa, Kellmei and Harrina village areas, SL-40 m, 24.iii.1997; 1 ♂, 2 ♀♀, Ulawa, Harrina village area, 40 m, 25.iii.1997, W. J. Tennent (all BMNH); 1 ♂, Ulawa, v.1934, R. A. Lever (OUM); 1 ♂, ditto, 19.v.1934 (OUM).

Comment. This is one of several distinctive butterflies apparently confined to the small island of Ulawa, despite the close proximity of that island to Malaita. Both the *Euploea* and *D. affinis* phenotypes which fly there have more affinity with distant dark-winged western races than with the white-winged forms of nearby Malaita and San Cristobal, a circumstance which prompted Ackery & Vane-Wright (1984: 152) to question the labelling accuracy of some of Woodford's Ulawa danaine butterflies.

***Danaus affinis mendana* ssp. n. (Figs 53, 54, 59, 60)**

Description. Male fwl 33 mm; small and dull in comparison to other Solomon Islands races; ups markings small and inconspicuous (vestigial or absent in *D. a. decipiens*; more extensive in all other Solomons races); median white markings absent; uns with similar markings, dull; genitalia not examined. Female similar.

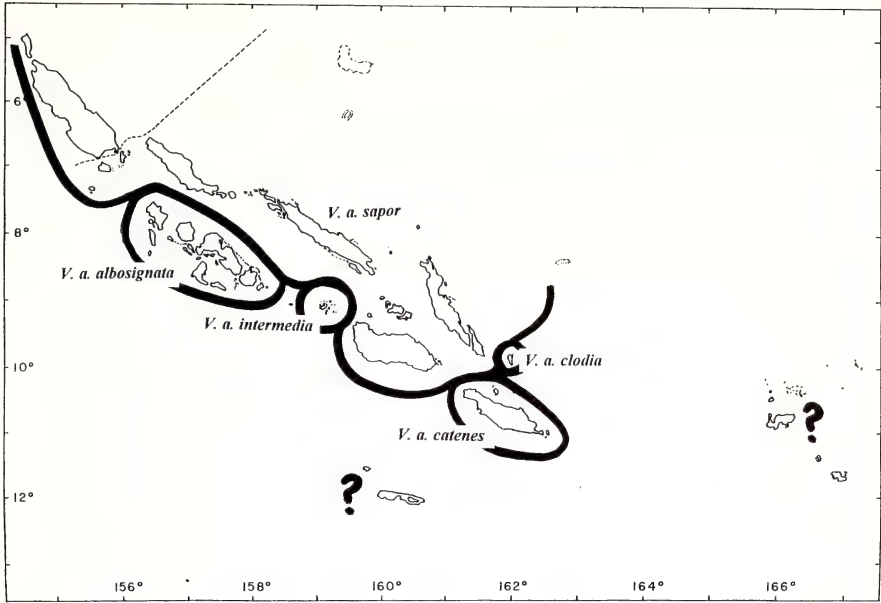
Distribution. Reported from Ndeni (Santa Cruz) and the Reef Islands, flying in January, February and October. It is not known whether *D. affinis* flies on other islands of the Santa Cruz Group.

Type material. HOLOTYPE ♂: Solomon Islands, Santa Cruz Group, Ndeni Island, 10–15 km south of Lata, 100–180 m, 14.x.1997, W. J. Tennent (BMNH). PARATYPES: 1 ♀, Santa Cruz Group, Ndeni Island, Graciosa Bay, Luembalble river to Luesalo (RTC), SL, 12.x.1997, W. J. Tennent; 4 ♂♂, 2 ♀♀, Santa Cruz [Ndeni], Graciosa Bay, 20.ii.1956, F. R. Hollins (all BMNH).

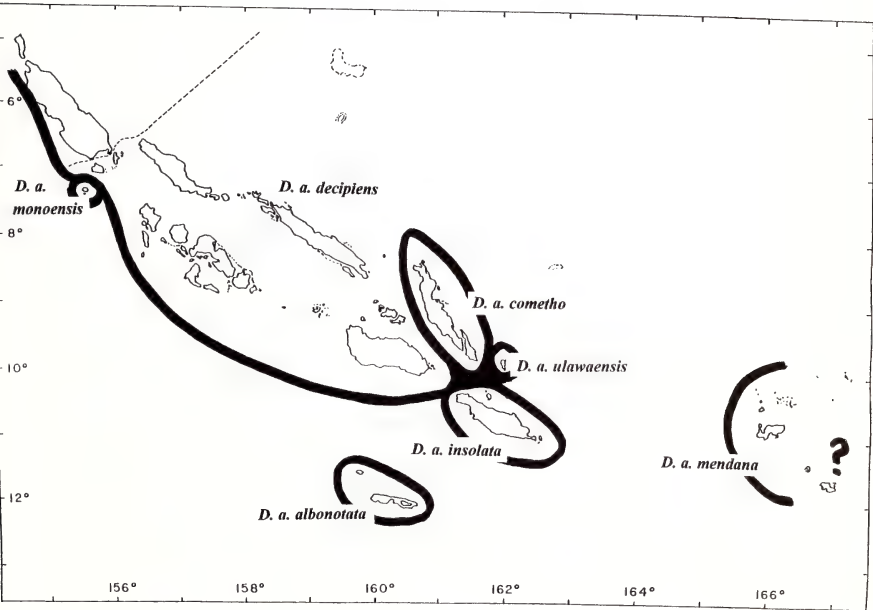
Etymology. Named after the Spanish explorer Alvaro Mendaña, credited with being the first European to 'discover' the Solomon Islands, whose second, ill-fated, expedition to the western pacific in 1595, resulted in his death from disease on Ndeni.

Comment. Placement of populations of *D. affinis* to subspecies is often uncertain (R. I. Vane-Wright, pers. comm.) and the status of the many widely diverse Pacific populations is not clear. The species is inclined to evolve distinctive phenotypes on islands throughout the Malay Archipelago and it flies throughout the Solomons, including the Santa Cruz Group, with several distinct races on remote islands. In overall appearance, races often have little obvious affinity with those on neighbouring islands, possibly due to a 'founder effect' which allows for rapid divergence from a limited gene pool brought by 'founder' individual colonists. In the Solomons, there is also what is presumed to be significant pressure on phenotype brought about by mimetic relationships among species of *Euploea*, *Danaus* (Danainae) and *Hypolimnas* (Nymphalinae).

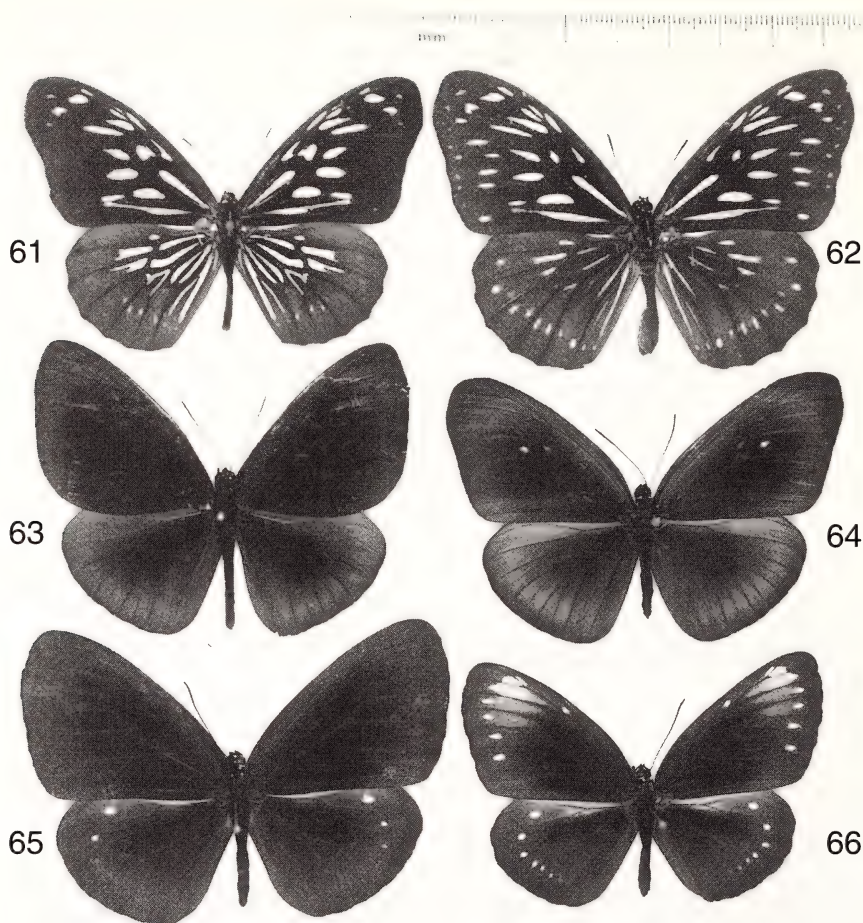
Ackery & Vane-Wright (1984: 153) remarked on a "curious *D. affinis* form" based on specimens in the BMNH from the Santa Cruz Group. Further material has since become available. In comparison with other Solomons *affinis*, this race is small and dull, with all white markings reduced in size and extent. This paper raises the number of described *D. affinis* races present in the Solomon Islands to seven: *decipiens* (TL: 'Solomon Islands'); *monoensis* (TL: Treasury); *albonotata* (TL: Rennell); *cometho* Godman & Salvin, 1888 (TL: Malaita); *ulawaensis* (TL: Ulawa); *insolata* Butler, 1870



Map 2. Distribution of *Vindula arsinoe* in the Solomon Islands.



Map 3. Distribution of *Danaus affinis* in the Solomon Islands.

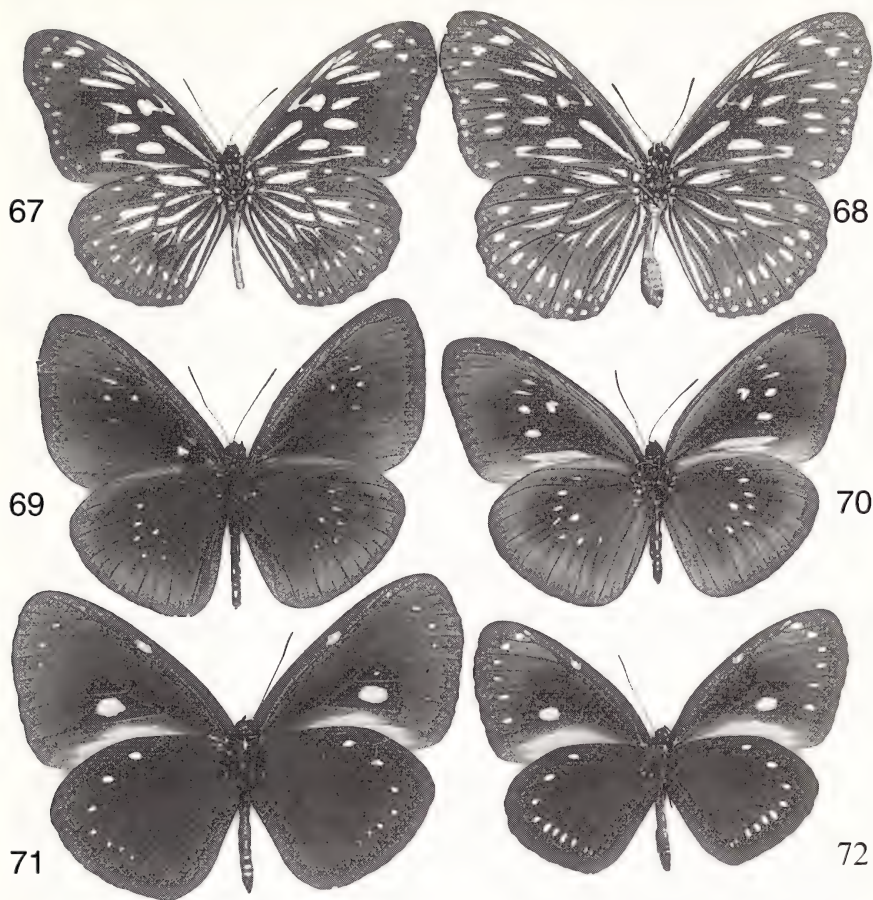


Figs 61–66, upperside, 67–72 underside. *Tirumala hamata richardi* ssp. n. (Ulawu), 61, 67 ♂ holotype; 62, 68 ♀ paratype; *Euploea batesii ackeryi* ssp. n. (Ulawu), 63, 69 ♂ holotype; 64, 70 ♀ paratype; *Euploea leucostictos polymela* (Ulawu), 65, 71 ♀; *Euploea leucostictos* form *roseus* form n. (Ulawu), 66, 72 ♀ type.

(TL: 'Solomon Islands' [San Cristobal]); *mendana* (TL: Ndeni). Distribution of these races is shown on Map 3.

***Euploea batesii ackeryi* ssp. n. (Figs 63, 64, 69, 70)**

Description. Male fwl 40 mm; similar to other Solomons races of *E. batesii* C & R Felder, 1865; ups brown, unmarked (variable, but usually with upf postdiscal spot

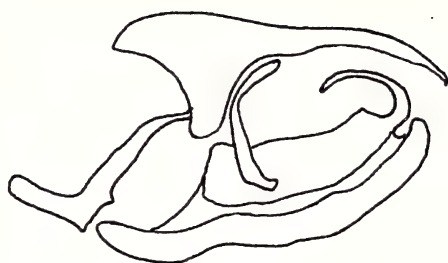
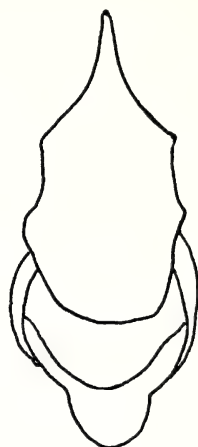
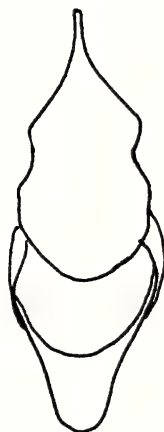


Figs 67–72 (caption opposite).

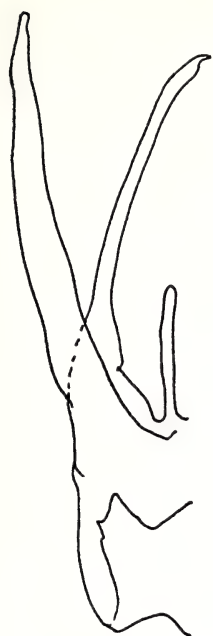
and at least a trace of upf pale streak above submedian vein in *E. b. honesta* Butler, 1882; uph with submarginal series of white spots in *E. b. woodfordi* Godman & Salvin, 1888; upf apex extensively suffused white in *E. b. leucacron* Carpenter, 1953; uns brown; median/postmedian spots reduced in size and number; genitalia not examined. Female ups unmarked except for 2 or 3 obscure fw discal spots, no trace of prominent pale streak above median vein which characterises most individuals of *E. b. honesta*; uns similar to *E. b. honesta*; markings small.

Distribution. Ulawa.

Type material. HOLOTYPE ♂: Ulawa, north, Su'umoli, SL, 22.iii.1997, W. J. Tennent (BMNH); PARATYPES: 1 ♀, same data as holotype; 1 ♀, Ulawa, north,

**73a****73c****73b****74a****74b**

Figs 73–74, male genitalia. 73, *Phaedymanthia fissizonata philipi* a, genitalia (lateral view), aedeagus removed; b, tegumen (dorsal view); c, aedeagus (lateral view); 74, *Phaedymanthia viridens* a, genitalia, aedeagus removed (lateral view); b, tegumen (dorsal view).

**75a****75b****75c****76a****76b****76c****77a****77b****77c**

Figs 75–77, male genitalia. 75, *Argyronympha rubianensis* a, genitalia (right side), aedeagus removed; b, pseuduncus (posterior section) (lateral view); c, aedeagus (lateral view); 76, *Argyronympha gracilipes* a–c, ditto; 77, *Argyronympha danker* a–c, ditto.

Kellmei and Harrina village areas, SL-40 m, 24.iii.1997, W. J. Tennent (both BMNH).

Etymology. This taxon is named after Phil Ackery, authority on the Danainae.

Comment. As with several other Ulawa endemic butterfly taxa, *batesii* from Ulawa is more similar in appearance to races which fly on islands further to the west than to those on the adjacent islands of Malaita, immediately to the west, or San Cristobal to the south.

Euploea leucostictos form roseus form n. (Figs 66, 72)

Description. Female fwl 40 mm; resembles *E. l. bellona* Howarth, 1962 (Bellona); upf dark brown; submarginal white spots prominent; subapical spots in spaces 4-8 with pinkish-white scales extending basad, particularly in space 6 (lacking in *E. l. bellona*; upf unmarked in *E. l. polymela* Godman & Salvin, 1888); upf submarginal spots prominent (small, series incomplete in *E. l. polymela*); uns with typical *leucostictos* markings, prominent (usually small, inconspicuous in *E. l. polymela*).

Distribution. Ulawa.

Type material. HOLOTYPE ♀: Solomon Islands, Ulawa, north, Harrina village area, 40 m, 25.iii.1997, W. J. Tennent (BMNH).

Comment. The race of *E. leucostictos* which occurs on Ulawa is *E. l. polymela*, which also occurs on the Shortlands, Treasury, Choiseul, Santa Isabel, Malaita, the New Georgia Group, Florida and Guadalcanal. The status of f. *roseus*, described as a form of *leucostictos*, is not clear. It is very different in appearance to the usual female of *E. l. polymela* (Figs. 65, 71), which varies little. The individual described was very distinctive in flight; no other specimens were seen.

ACKNOWLEDGEMENTS

Mr Moses Biliki, Ministry of Forests, Environment and Conservation, Honiara, supported the author's butterfly studies in the Solomon Islands; Mrs Audrey Ruza, Ministry of Education and Human Resources Development, Honiara, issued research permits for field work; Mr Tim and Mrs Relma Turner, were generous in their hospitality in Honiara; Mr Ian Woods, USA Peace Corps, kindly collected material for the author on Vella Lavella; Mr George Hiva and Mrs Marion Ku'u provided guidance and hospitality in equal measure in the Russell Islands; Mr Ray Shannon, Auckland, New Zealand donated study material to the BMNH; Dr Marianne Horak, Department of Entomology, CSIRO, Canberra, Dr Scott Miller, Bernice P. Bishop Museum, Honolulu, and Mrs Ruth Liliuola, Dodo Creek Research Station, Honiara, kindly allowed access to, and loans from, the collections in their care. Further assistance was provided by Dr Chris Samson (GB-Maidstone), Mr Dick Vane-Wright, Department of Entomology, The Natural History Museum, London. The author's first field visit to the Solomon Islands in 1996 was partially funded by the Exploration Board of Imperial College of Science, Technology and Medicine, London, The Linnean Society, London and the Royal Entomological Society, London. Significant funding for this and subsequent field visits was provided by the Trustees of the Godman Exploration Fund.

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SHORT COMMUNICATION

Further records of *Nysius senecionis* (Schilling) in the London area.—Since first finding this small bug in 1998 in huge numbers on the banks of the Thames in urban central London (R. A. Jones; 1999, *Br. J. Ent. Nat. Hist.* 12: 229–231), I have continued to search for it, especially in association with the Guernsey fleabane, *Conyza sumatrensis* (Retzius).

During 1999 I was fortunate enough to take part in a capital-wide survey of railway tracksides for London Underground. The tracksides varied from dense wood and scrub to recently scoured banks where recent engineering works had taken place. Such works usually created at least partly scoured earthworks with areas of bare soil and disturbed ground—perfect sites for the rapid colonization of adventitious plants, including, of course, *Conyza*. Sure enough, almost wherever the *Conyza* occurred, so did the *Nysius*. It was recorded from the following widespread sites.

Ladbroke Grove, TQ448142, 22.vi.1999, two swept from *C. sumatrensis* growing out of rough ballast along with a few other sparse straggling plants beside the station platform.

Fulham Broadway, TQ256774, 5.viii.1999, many swept from the large stands of *C. sumatrensis* on a broad flowery embankment.

Parson's Green, TQ254770, 8.viii.1999, several sweeping *C. sumatrensis* growing from the trackside ballast at the edge of bramble scrub and narrow woodland.

Shoreditch, TQ340822, 11.viii.1999, many on *C. sumatrensis* growing up amongst the broken concrete foundations of a derelict building behind the station. The bug was also beaten off several small clumps of Oxford ragwort, *Senecio squalidus* Linnaeus, but could not be found on the many plants of Canadian fleabane, *Conyza canadensis* (Linnaeus) also present.

Loughton, TQ422951, 17.viii.1999, several swept from *C. sumatrensis* on a broad gently sloping area of rough grassland around the sidings.

Hendon, TQ232885, 23.viii.1999, several by sweeping *C. sumatrensis* on a broad embankment recently churned up by heavy earthmoving machinery.

Neasden, TQ221852, 22.ix.1999, many on the very large stands of *C. sumatrensis* covering one end of a narrow but very flowery embankment.

All of these sites are in highly urban parts of London, but it cannot be long before the fleabane and the bug are more widespread, travelling along the brownfield corridors of the railway lines.—RICHARD A. JONES, 135 Friern Road, East Dulwich, London SE22 0AZ.

EPHEMEROPTERA RECORDING SCHEME

The Ephemeroptera recording scheme has been set up under the auspices of the Biological Records Centre at Monks Wood, to encourage the recording of Ephemeroptera species throughout the British Isles. The principal aim of the scheme is to collect records of Ephemeroptera. This will allow distribution maps to be compiled and changes in the distribution of Ephemeroptera populations to be monitored.

The Ephemeroptera recording scheme is looking for any records of Ephemeroptera species from all over the British Isles. Adult Ephemeroptera can be collected throughout most of the summer, while the aquatic larvae of many species can be found during the winter, so that recording can be carried out all year round.

If you have records of Ephemeroptera species or you want to know more about the Ephemeroptera recording scheme then contact:

Ephemeroptera Recording Scheme

c/o Craig Macadam

East of Scotland Water, Pentland Gait, 597 Calder Road

Edinburgh EH11 4HJ

Tel: 0131 453 7508, Fax: 0131 453 7509

E-mail: craig.macadam@esw.co.uk

Website: <http://www.ephemeroptera.brittanica.freesevers.com>

CHANGES IN THE STATUS OF THE RED WOOD ANT *FORMICA RUFa* L. (HYMENOPTERA: FORMICIDAE) IN NORTH WEST ENGLAND DURING THE 20TH CENTURY

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Abstract. The red wood ant *Formica rufa* L. has declined in the Lake District during the course of the century, and has virtually disappeared since the 1950s. However, there are still thriving populations on limestone sites in both the Lancashire and Cumbria parts of the Arnside–Silverdale Area of Outstanding Natural Beauty (AONB), where it is present at 8 locations. The north end of Underlaid Wood, at SD492798, is now the northern limit of the species' range in England. Factors contributing to the decline are discussed, with the conclusion that the most likely cause of the collapse of the Lake District populations was a 3 year run of abnormally heavy May rainfall in 1966–1968, which caused extinction on several sites, after which the surviving populations continued to decline. The status of the remaining populations in the AONB, which do not appear to be under threat and are mostly on sites receiving favourable management, is reviewed.

BACKGROUND TO THE SURVEY

The wood ants *Formica rufa* L. and *Formica lugubris* Zetterstedt construct conspicuous mound nests, usually in woodland. Satchell & Collingwood (1955) reported the results of surveys in 1954 in the English Lake District. *F. rufa* was found in abundance in the South Lake District near Arnside and Grange-over-Sands, sparsely around Windermere (lake, not town) and at three isolated sites further north. *F. lugubris* was found to be present in the woodlands of the Duddon Valley from Duddon Bridge up to Seathwaite, and in Borrowdale around Ashness Bridge and up the Lodore Beck. The distribution of *F. lugubris* has not changed in the past 45 years. It is still common in the woodlands of the Duddon Valley (Karen Sampson, English Nature, *pers. comm.*, and N.A.R. obs. 1998). In Borrowdale its nests can readily be seen beside the Ashness Bridge car park and along the roadside through Lodore Woods. However, a preview of the distribution map for *F. rufa* (Edwards, 1997) indicated that it had disappeared from its former locations in the Lake District, though it was still present in the Arnside area. Decline of *F. rufa* populations has also been reported in Wales (Fowles, 1994), and in Cheshire, where they have disappeared from the Delamere Forest (Carl Clee, *pers. comm.*). It was to investigate the current distribution of *F. rufa* in Cumbria and Lancashire, and the possible reasons for its decline, that this study was begun in 1996, and completed in 1999 with support from English Nature's Species Recovery Programme, with some final updating in 2000. This account draws heavily on the 1955 paper for historical details.

CHANGES IN DISTRIBUTION BEFORE 1954

Satchell & Collingwood (1955) described *F. rufa* as being found in abundance on Carboniferous limestone near Arnside and Grange-over-Sands, and sparsely on the Silurian slates and flags around Windermere. There were, in addition, three isolated sites: at Hoff Lunn near Appleby, Parson's Park, Caldbeck, each with a few colonies only, and Dodd Wood on the Bassenthwaite slopes of Skiddaw, representing the

most northerly outposts of the species. They distinguished between sites on the Carboniferous limestone along the southern edge of the Lake District and around Arnside (now known as the Morecambe Bay Limestone Natural Area) and those on the Silurian slates and flags and other formations further north (Lake District Fells and Dales Natural Area). They concluded that, in the latter, wood ants were already in decline because, although there were still 7 active sites on these rocks (Table 2, Section A), there were also 9 sites where colonies had become extinct during previous decades (Table 1).

The locations of both categories of these sites are shown by tetrads in Fig. 1 (not all the sites appear because in some cases more than one occur in a single tetrad). The 1955 authors did not give grid references, but the sites have been located to the nearest 1 km square of the national grid from their table of sites (which also gives details of geology and woodland type). The 1km square references are given in the Tables 1 and 2. Some which could not be located accurately are indicated by "?".

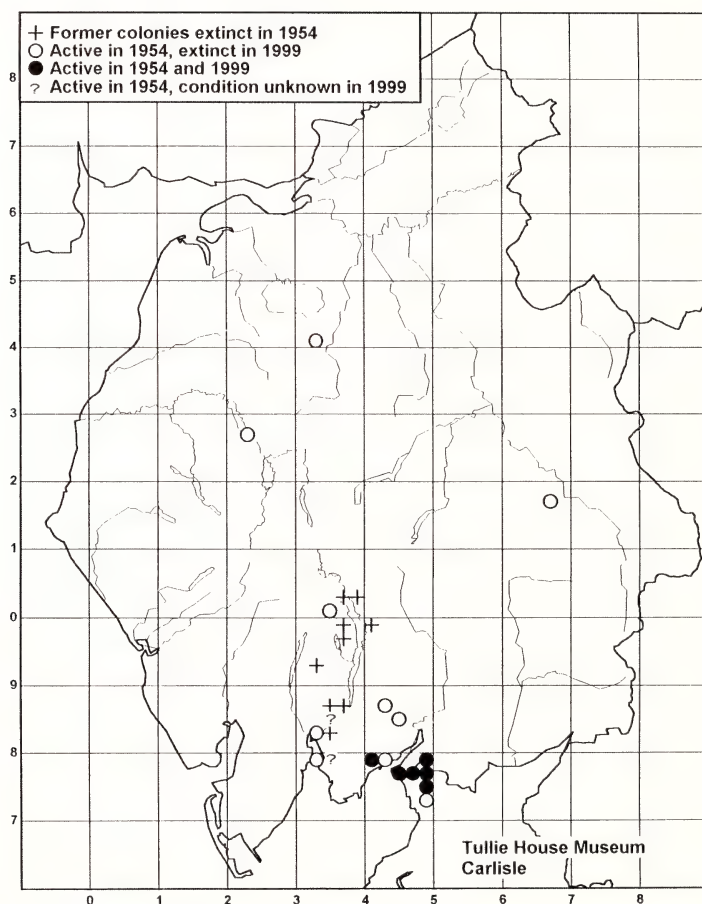


Figure 1

Table 1. Former sites extinct by 1954

Lakeside	SD3787	Ants used to be carried to Graythwaite for pheasant food
Black Brows, near Claife	SD3797?	
Low Wood, Windermere	NY3802	Recorded 1912
near Satterthwaite	SD3392?	One colony last seen about 1924
Powder Works, Backbarrow	SD3483?	Ants last seen about 1929
Heald Wood near High Wray	SD3799?	Ants last seen about 1934
Rayrigg Woods near Bowness	SD4098	Ants last seen about 1934
Yewbarrow near Newby Bridge	SD3587	One colony last seen about 1939
Beck Pane Wood near Ambleside	NY3602	Ants last seen about 1947

Table 2. Sites with colonies in 1954

Site	Grid ref.	Nests in 1954	Condition by 1999
<i>Section A: Sites on acid rock</i>			
Hoff Lunn	NY6616	1 nest	last seen 1967
Dodd Wood	NY2327	numerous but localised	absent 1993
Parson's Park	NY3340	several nests	absent 1993
Burn Barrow Wood	SD3482	several nests	not checked
Haverth. Heights	SD3484	1 nest	not checked
Ellerside Breast	SD3579	3 nests	not checked
Roudsea Wood	SD3282	1 nest known 1960s	active until 1996, defunct 1999
<i>Section B: Sites on limestone</i>			
Part 1: north side of Morecambe Bay			
Blawith Fell	SD4178	numerous	3 nests in 1996, 2 nests by 2000
Eggerslack	SD4078	numerous	2 nests in 1996, expired 1998
Yew Barrow	SD4078	1 nest	not found 1996
Meathop Fell	SD4379	numerous	several nests 1988, absent 1999
High Crag Wood	SD4485	numerous	absent early 1970s, ditto 1996
Park Wood	SD4386	numerous	absent early 1970s, ditto 1993
White Scar	SD4585	1 nest	not checked
Old Park Wood	SD3378	numerous, 30 counted	absent 1993
Part 2: Arnside-Silverdale area			
Cumbria			
Arnside Park/Knott	SD4477	numerous	numerous, larger area, at least 100 nests
Underlaid Wood	SD4878	numerous	widely distributed, est. c. 90 nests
Marble Quarry	SD4978	not known	7 nests found in 1999
Major Woods	SD4978	not known	20 nests found in 1999
Grubbins Wood	SD4478	not known	13 active nests in 1999
Lancashire			
Gait Barrows	SD4877	numerous	abundant, over 100 nests counted 1996
Cringlebarrow	SD4974	numerous	present, 20 nests counted
Eaves Wood	SD4677	numerous but localised	34 nests counted in 1999, scattered
Grisedale Wood	SD4873	numerous	absent
Trough Plantation	SD4875	numerous but localised	absent

Of the 22 sites where *F. rufa* was found, 15 were in the Arnside–Grange area, extending from Old Park Wood in the west, through the Grange area, to Whitbarrow in the east; and from Arnside south to Cringlebarrow. These are shown in Fig. 1 and listed in Table 2, Section B (which also gives their condition at the end of the present survey). The 1955 paper discussed physical factors possibly influencing distribution. It was concluded that the rather open limestone woodlands of the South Lake District, free draining and with a high proportion of bare, well insolated rock, provided more suitable conditions for *F. rufa* than woods on other formations in the area. It was also noted that this area, besides its limestone geology, differed climatically from the Windermere area. The 49°F (9.4°C) isotherm (average mean of the daily mean temperatures 1901–30) corresponded roughly with the northern limit of the area in which *F. rufa* was abundant, and the average annual rainfall of Arnside was about 22 inches (56 cm) less than that of Windermere.

CHANGES BETWEEN 1954 AND 2000

By the end of the recent survey it was concluded that all the colonies on the northern acid rocks had expired, and that only 2 nests survived on limestone (at Brown Robin) on the north side of the Bay. There was, however, no indication of decline in the Arnside–Silverdale AONB.

In the early 1970s people began to notice that wood ants had disappeared from most of the sites on limestone in the South Lake District where they had previously been numerous, though now, so long after the event, it is not easy to establish the facts. During this period Peter Howard (*pers. comm.*), then at Merlewood Research Station, noticed grassed-over mounds in Eggerslack Wood, which probably were defunct *F. rufa* nests (though on this site 2 nests did survive until 1998). It seems that in the same period the ants had disappeared from their stronghold in Old Park Wood, Holker, where 30 nests had been counted in 1954, and from Witherslack Woods where there had been numerous nests on the woodland edge along the foot of the scree below Whitbarrow, and local people had noticed their absence in the early 1970s (Cedric Collingwood, *pers. comm.*). In Limegarth Wood on Meathop Fell, where there had been numerous nests in 1954, Cedric Collingwood noticed a decline in 1967–69. From these observations, and the general recollections of local people canvassed by Cedric Collingwood, it appears that a drastic decline of *F. rufa* on South Lake District limestone sites took place in the last few years of the 1960s, to the extent of extinction on some of the sites by the early 1970s.

The only limestone sites on the north side of the Bay where wood ants are known to have survived are: Meathop (Limegarth) Wood where several nests were still present in 1988 (Michael Sykes, ex-ITE, *pers. comm.*), Eggerslack Wood with 2 nests until 1998 and Brown Robin (Blawith Fell) with 3 nests in 1996, but only 2 by 2000. Checks by Cedric Collingwood in 1991–93 at Old Park Wood and Witherslack found no wood ants. However, there is no indication of decline in the wood ant population on Arnside Knott, only 2 km in latitude further south, and wood ants were abundant on Gait Barrows, in Lancashire, when the NNR was established in 1975.

Little information is available about the fate of the outlying northern colonies during this period. The Hoff Lunn nest was last recorded in 1967, when a note initialled P.S. in the *Field Naturalist*, Vol. 11 No. 4, 1967, reported that: “a very small nest was found in birch scrub this summer some 80 yards from the original site”. In

1991–93 Cedric Collingwood found that they were no longer present at Dodd Wood, Skiddaw, or at Parson’s Park, Caldbeck.

No attempt was made during the survey to trace the nests known in 1954 at Ellerside Breast, Burn Barrow Wood or Haverthwaite Heights because there was no precise location information and too large an area to search. There had only been a few nests, even in 1954. Renny Park Coppice was visited in 1999 but no nests were seen in this acid oak woodland, which contained much rhododendron and clearly had been managed as a pheasantry in the past. The Dodd Wood and Calbeck sites had been reported as defunct by Cedric Collingwood by 1993. Stephen Hewitt was unable to find the Hoff Lunn nest in 1999, but there was no information about its former location on this large site. In 1998 I learned that there had been a single nest at Roudsea Wood (SD3282), situated in a conifer plantation on Silurian rock. This nest had been known to Cedric Collingwood, though not during the original survey, but is presumed to have been present at that time. It was known to the NNR staff into the 1990s, but was found to be defunct in 1999.

CHANGES WITHIN THE SURVEY PERIOD 1996–2000

A request for current records of *F. rufa* was published in the *Carlisle Naturalist* in March 1996 (Vol. 4, No. 1). The only positive information which was received was that they were still present at Brown Robin (SD4178), the Cumbria Wildlife Trust (CWT) Reserve on Blawith Fell near Grange-over-Sands. In 1996 three nests were found in a coppice enclosure: one very large, clearly long-established, and 2 smaller colonies. Two long-established nests were also found in nearby Eggerslack Wood (SD4078). In March 1997 they were beginning to be active, but May was a very wet month (Table 3) and in the autumn they were all found to have accumulated very little thatch, suggesting they had not had a good season. In 1998 it was found that both nests in Eggerslack Wood had expired, as had also the largest one in Brown

Table 3. Monthly rainfall at Merlewood (mm)

	April	May	June
1959	121.0	42.5	116.2
1960	92.6	79.1	73.0
1961	144.8	50.6	72.2
1962	99.3	91.8	62.8
1963	93.7	84.5	92.1
1964	74.3	99.9	101.2
1965	77.5	84.7	124.4
1966	92.0	122.7	139.8
1967	39.5	133.4	68.7
1968	61.5	104.2	92.4
1969	79.6	93.8	89.7
1970	142.1	27.6	57.2
1996	88.2	63.2	38.0
1997	33.9	115.7	72.8
1998	64.2	47.5	175.1
Mean	72.0	70.5	82.0

Robin. A check of nests on Arnside Knott and Gait Barrows found no corresponding decline in these sites further south. By October 1999 the larger of the two survivors in Brown Robin seemed to be defunct, having disappeared, like all the surrounding area, under dense growth of bramble, but in 2000 was found to be still active. The other colony had moved from its mound to a more favourable site. It looked very weak, but was still surviving in 2000.

POSSIBLE FACTORS RESPONSIBLE FOR DECLINE, BEFORE 1954

At the time of the 1954 survey the populations of *F. rufa* on the limestone appeared to be stable, but those on the Silurian rock further north were clearly in decline. The more stringent climatic conditions in the Windermere woodlands and the reduction of ground insolation by invading bracken were considered by the 1955 authors to be the major factors contributing to the decline. However, they had found records, and much anecdotal information, which suggested that many of the locations on the Silurian had been introductions. The practice of introducing wood ants into pheasantries was widespread towards the end of the 19th century; attempts being made to establish colonies as sources of brood for feeding to young pheasants. The colonies at Renny Park Coppice, Beck Pane Wood and other parts of the Brathay Hall Estate had been introduced, according to local information, about 60 years earlier. The ants at Haverthwaite Heights were also said to have been introduced, likewise those at Dodd Wood, near Keswick, and there had been an unsuccessful attempt to establish them on the Lowther Estate near Penrith from Hoff Lunn. There was also supposed to have been an unsuccessful attempt to introduce ants from the Duddon to the Grizedale Estate—the only report of an introduction involving *F. lugubris*. This activity must have involved removing colonies from their habitat and depositing them in sites not of their choosing, and, more seriously, outside what seems to have been their natural northern climatic limit at the time. It is, therefore, not surprising that they did not thrive. It seems significant that only at Dodd Wood were nests described as numerous, elsewhere usually one or a few, suggesting that this was the only site where introduction had succeeded in establishing a population. The fact that they persisted so long at other places, before finally expiring, suggests remarkable vigour and tenacity on the part of the species.

It was, however, interesting to observe during the survey that wood ants can coexist with pheasant rearing. Pheasants may scratch and scatter nests but do not seem to do serious damage to the colonies, unlike badgers, which sometimes deeply excavate them. Sometimes nests were found next to pheasantries, in clearings made for the birds. Green woodpeckers, which certainly eat ants, have been suspected of damaging colonies, making conical holes in the mound, particularly in autumn, and leaving characteristic “cigarette-end” droppings, but this damage seems to be only superficial.

POSSIBLE FACTORS AFTER 1954

Loss or mismanagement of habitat is frequently blamed for loss of species, but a surprising feature of the drastic decline of *F. rufa* on South Lakeland limestone sites in the late 1960s is that the ants disappeared from sites where the habitat had not changed and still appears to be suitable. At Old Park Wood, for instance, there is bare limestone in patchy woodland, and along the foot of Whitbarrow there is still, along the woodland edge, well insulated scree sheltered by overhanging cliffs, exactly

as described in 1955. This, and the fact that the ants disappeared or declined over such a wide range of sites at the same time, while apparently being unaffected only 2 km in latitude further south, suggests that a climatic factor was the primary cause of the collapse of the south Lakeland populations.

The best-remembered event of this period was the exceptionally severe winter of 1963, when the ground was frozen to unprecedented depths. This, however, is unlikely to have been responsible since *F. rufa* is unaffected by the prolonged sub-zero conditions of Scandinavian winters (Cedric Collingwood, *pers. comm.*). The effects of heavy rainfall at critical times in the life cycle seem a more probable cause. In Cedric Collingwood's opinion (*pers. comm.*), the critical period is May, when the colony is rearing the new season's brood. If this is successful the colony can survive even a bad summer. Conversely, failure to rear the brood may render the colony unable to carry out its functions; and hence to survive. Merlewood Research Station, near Grange-over-Sands, began recording minimum and maximum temperature in 1980, but has been keeping rainfall records since 1959. These show that May, on long-term average, is the driest month of the year, which must generally be favourable to the ants. However, Table 3 gives the monthly rainfall (mm.) for April, May and June 1959–1970, and also for 1996–1999, as the latter appears relevant to recent events. This shows that May 1966, 1967 and 1968 had exceptionally high rainfall, being 74%, 89% and 48% in excess of the long-term mean for the month. The wet May of 1966 was also followed by an exceptionally wet June: 70% over the mean. Rainfall in May of over 100 mm has occurred sporadically in other years, but 1966–1968 are the only three years in the recording period in which it occurred in succession. The present author considers this run of consecutive wet springs to be the most likely cause of the collapse of *F. rufa* populations at that time. The wet May of 1997 is also suspected of contributing to the demise of the 2 nests in Eggerslack Wood and one in Brown Robin, and probably also the one at Roudsea.

This conclusion raises questions as to why the populations in the Arnside area, only 2 km in latitude further south, were not affected; and why those populations which survived the 1966–1968 collapse did not recover. No information is available as to how the Arnside populations fared in the 1960s, but, as only two populations have disappeared and the remainder appear vigorous, it can be concluded that they were not seriously affected. No comparable monthly rainfall figures have been obtained, but the meteorological information of the 1955 authors indicates an annual rainfall of about 1016 mm for Arnside, whereas the long-term monthly mean for Merlewood gives 1212 mm. This suggests that the rainfall at Arnside could have been less in the critical period. Small differences in climatic conditions can have a disproportionately large effect on species at the edge of their range, and it appears that the events of 1966–1968 initiated a contraction of the northern limit of *F. rufa* in North West England by 2 km of latitude. By circumstances of geography, this was enough to render it almost extinct in the southern Lake District. The three places where it survived longest are clustered around Grange-over-Sands, which is noted for its mild climate.

The question as to why the surviving populations did not recover requires (brief) consideration of the biology and the habitat requirements of the species. Males and queens emerge from nests in June and mating takes place on or near the nests, after which the queens shed their wings. Although literature states that mated queens can establish nests by taking over colonies of *F. fusca* or *F. lemni* (Skinner & Allen, 1996), this seems to have rarely been observed. It is probable that colonies most commonly propagate through budding, in which mated queens return to the natal nest and recruit a group of workers to move out and establish a new colony. With

regard to habitat, *F. rufa* is a shade-tolerant woodland ant which maintains higher than ambient temperature in the nest in summer using metabolic heat derived from their intake of carbohydrates in 'honeydew' from aphids (Bryan, 1977; Pontin, 1996). Measurements of the percentage of the potential insolation which was actually reaching ant nests in the south of England (Pontin, *op. cit.*) indicated that *F. rufa* nests were most commonly found in partial shade, but could persist in under 25% insolation, and fewest were found in over 75%. General observations suggest that the picture is much the same in the North West of England. Nests are commonly found in sheltered situations receiving some sunlight, e.g. on woodland edges, or by the sides of rides and paths, often just under the edge of the branches of an adjacent tree or shrub. However, on Arnside Knott and Gait Barrows NNR, where one frequently finds new nests, composed only of thatch, "middle-aged" nests which are developing soil bases and very old nests with soil bases 3 m or more in diameter, often becoming shaded and abandoned. There is clearly a continual turnover of nests as colonies move or expand. The static state is seen on sites with closed canopy, such as Major Woods and parts of Cringlebarrow–Deepdale. Here there are few, if any, new nests but widely separated very large old nests, typically with tall steep-sided conical mounds on very wide soil bases. The availability of good forage trees from which the workers can obtain honeydew and insect prey is likely to be the critical factor in enabling these shaded colonies to persist, but it is not certain that they can survive indefinitely under these conditions. The environment of nests must therefore be profoundly affected by woodland management. The practice of coppicing (cutting woods on rotation and promoting regrowth from stumps) which would have maintained the ant's most favoured habitat, was the main mode of woodland management in the Lake District from the Middle ages to the 1914–1918 War. In the Midlands *F. rufa* can live under closed canopy (Cedric Collingwood, *pers. comm.*) but under the more stringent climatic conditions of the southern Lake District the decline of coppicing and consequent exclusion of sunlight by closure of the canopy is likely to have been generally disadvantageous to the ants. This situation can be seen in the sites where *F. rufa* persisted for a time. Limegarth Wood (Meathop Fell) was last coppiced in 1940 (Michael Sykes, *per. comm.*) and has gradually reverted to closed canopy. Eggerslack Wood has not been actively managed recently, and coppicing was not resumed in Brown Robin until 1995.

A further factor militating against the survival of small populations is likely to be decline in vigour due to reduction of the gene pool. Mating of queens outside the nest with males from other colonies gives the potential for reinvigorating the stock by outbreeding, but this must decrease as the number of nests decreases. This probably explains why one or two nests may persist on a site for a very long time, but gradually become weaker.

STATUS OF POPULATIONS IN 2000

In the Arnside–Silverdale AONB the more open conditions of some of the sites, their management as woodland resource or for rare butterflies by coppicing, glade creation and scrub control, and the more favourable climate can account for the

ant's continued presence. At present the populations appear to be stable and not under threat. The 1954 locations were confirmed, except for Trough Plantation where no nests were found, and Grisedale Wood where the owner and keeper both assert that there are no wood ants. However, 3 sites were found which did not figure in the earlier survey, giving a total of 8 locations.

Attempts were made to count the nests on all the extant sites, in order to put minimum sizes on the populations, but this proved impractical for large sites, for which estimates had to be based on partial counts. The results are summarised in Table 2, Section B, and the sites can be classed as follows:

Major Populations

Gait Barrows NNR (Lancs.)—112 nests counted by students in 1996 (Farinacci & Smith, 1996).

Arnside Knott SSSI (Cumbria)—encompasses the hill of the Knott and Heathwaite (National Trust) and the private woodlands of Copriding and Arnside Park. The 1955 report named and mapped only Arnside Park, which is now dense woodland, but the population is much more extensive. In 1999 National Trust staff counted 70 nests on the Knott. As c.20 can be seen along the cliff-top path on the south of Arnside Point, and they are also present in Frith Wood and on Heathwaite, the total population of the SSSI must be at least 100 nests.

Underlaid Wood SSSI (Cumbria)—30 nests were counted in the part south of the footpath to Fairy Steps. As this is about one-third of the SSSI, and similar habitat with nests extends to the north end, an estimate of c.90 nests can be made. The north end is now the northern limit of range of *F. rufa* in England as it is about 9 km north in latitude of the only remaining colony in Yorkshire, at Dallowgill (SE1871).

Medium populations

Cranglebarrow–Deepdale SSSI (Lancs.)—20 nests counted in Deepdale and extending onto the south end of Cringlebarrow.

Eaves Wood SSSI (Lancs.)—National Trust staff counted 34 nests in 1999.

Major Woods (Cumbria)—20 nests counted, probably more.

Minor populations

Marble Quarry and Hale Fell SSSI (Cumbria)—only 7 nests found, though more have been reported (Martin Colledge FC, *pers.comm.*), but it only seems to support a small population.

Grubbins Wood CWT Reserve (Cumbria)—10 large active nests found, and 3 small ones.

Brown Robin CWT Reserve (Cumbria)—2 nests, one very weak.

IMPLICATIONS AND GUIDELINES FOR CONSERVATION MANAGEMENT

Although nests can persist for a long time under closed canopy, they are most active in more diverse conditions.

Wood ants benefit most from continual low-key management operations which do not drastically alter the habitat: e.g. selective thinning or timber extraction, coppicing and the creation of glades for butterflies or pheasants.

Once woodland has become over-mature it is difficult to retrieve the situation, because heavy thinning or drastic coppicing may remove trees which shelter nests from rain, and important forage trees near nests, without necessarily reducing

shading by other trees. Alternatively, if it does admit light it may promote the growth of ground vegetation such as bramble which can smother nests and indeed the whole woodland floor.

Because of their dependence on colony reproduction by budding, if conditions become unfavourable they are unable to respond by dispersing into new sites. Therefore they need to be conserved where they are.

Although, as a generalisation, any low-key management is better than none at all, wherever possible woodland management should take account of the needs of individual wood ant nests. Trees or shrubs which shelter nests, usually on the north, should not be removed, but it is beneficial to admit more light from the south and west and to create open areas nearby into which new colonies can establish.

THE "GUEST ANT" *FORMICOXENUS NITIDULUS* (NYLANDER)

This tiny (3 mm) ant lives only in nests of *F. rufa* and related species of wood ants, apparently stealing food from its hosts, but not harming them or being harmed by them. It is rarely seen except in autumn when males, which are wingless and resemble workers, emerge onto the surface of the mound. During the survey they were seen on nests on Gait Barrows NNR and Arnside Knott SSSI (Robinson, 1998, 1999) and at Underlaid Wood SSSI. They were not seen at Eaves Wood SSSI, but have been reported there by Keith Alexander (NT) and Cedric Collingwood (*pers. comm.*)

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A SCUTTLE FLY (DIPTERA: PHORIDAE) NEW TO BRITAIN CAUGHT IN A NET SUSPENDED 200 METRES ABOVE THE GROUND

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Abstract. *Triphleba renidens* Schmitz is added to the British List. The female attributed to *T. inaequalis* Schmitz by Schmitz is now recognised as being *T. vitrea* (Wood). The missing female of *T. inaequalis* is then recognised as being *T. chandleri* Disney, which is therefore synonymised with *T. inaequalis*.

INTRODUCTION

The aerial fauna at approximately 200 m above RAF Cardington, Bedfordshire, was sampled continuously for a 10 day period during July 1999. Airborne arthropods were sampled with a fine mesh net, with an aperture of 0.64 m², that tapered to a detachable bag. The net was suspended underneath a tethered, aerodynamically-shaped balloon filled with helium, and could be closed at the end of sampling periods by a radio-controlled device. The altitude of the balloon during sampling periods was estimated from the length of the anchoring cable and the angle of its elevation (measured by an inclinometer). Estimated sampling heights on the dates referred to below were 235 m on 9.vii.1999, 178 m on 11.vii.1999 and 200 m on 15.vii.1999. Insect samples were killed immediately, stored in ethanol, and identified to family (by JWC). Samples were composed predominantly of aphids, small Diptera and parasitic Hymenoptera.

Of a total of 289 Diptera sampled at altitude, four were Phoridae. Previous aerial trapping studies have also found Phoridae to be frequently caught at altitude (e.g. Hardy & Milne, 1938; Glick, 1939). Indeed this and other evidence (reviewed by Disney, 1994) indicates that long-range wind-borne dispersal may be widespread in this family. The four Phoridae obtained in the suspended net were identified (by RHLD, who has deposited the specimens in the Cambridge University Museum of Zoology) as a gravid female of *Megaselia pleuralis* (Wood), with 20 nearly mature eggs (measuring 0.4 mm in length), on 9.vii.1999; a male *M. longicostalis* (Wood) on 11.vii.1999; a female *Megaselia* sp., possibly the hitherto unknown female of *M. drakei* Disney, but the females of this group remain poorly known; and a male *Triphleba renidens* Schmitz on 15.vii.1999. The latter is the first British record of this otherwise rare European species. Its identification is detailed below. The female of the related *T. inaequalis* Schmitz is reconsidered and it is concluded that the female specimen attributed to this species by Schmitz (1943) is really a female of *T. vitrea* (Wood). This conclusion then allows recognition of *T. chandleri* Disney as the missing female of *T. inaequalis*, so that *T. chandleri* is thereby synonymised with *T. inaequalis*.

TRIPHLEBA RENIDENS SCHMITZ

In the key to British species (Disney, 1983) the males are identified as *T. vitrea* (Wood) (couplet 19 lead 2). However, the left process of the epandrium is distinctly

longer in *T. renidens* and extends well beyond the tips of the longest hairs on the cerci (cf Figs 2 and 3). *T. inaequalis* Schmitz (Fig. 1), not yet reported from Britain, is somewhat intermediate between *T. renidens* and *T. vitrea*. In the keys to the Palaearctic species (Schmitz, 1943) *T. renidens* and *T. inaequalis* are further distinguished by the frons being shiny in the former and dull in the latter species. In slide mounted specimens this translates into the microsetae being minute and sparse (and being mainly found outside the area bounded by the antial and pre-cellar bristles) in *T. renidens*, and into being larger and dense in *T. inaequalis*. The frons of *T. vitrea* resembles the latter species. Indeed, these two species are very similar, but in *T. inaequalis* the left epandrial process is a little longer than that of *T. vitrea* and the longest hairs of cerci do not reach the level of the tip of the process (cf Figs 1 and 3).

The females of these three species are very similar to each other but are poorly characterised by Schmitz (1943). That of *T. renidens* will be identified as *T. vitrea* (couplet 19) in the key to British species (Disney, 1983). The abdominal sternite 7 of *T. vitrea* as Fig. 4. This so closely resembles the figure of the S7 of *T. inaequalis* given by Schmitz (Fig. 113f) that it raised doubts about their distinction, discussed below. Schmitz did not illustrate the S7 of *T. renidens*, but he described it as being strikingly large, shovel shaped and with a hind margin that is a broad, rounded, gentle arc. The female now attributed to *T. inaequalis* (see below) has the S7 narrowed behind to a dark projecting process.

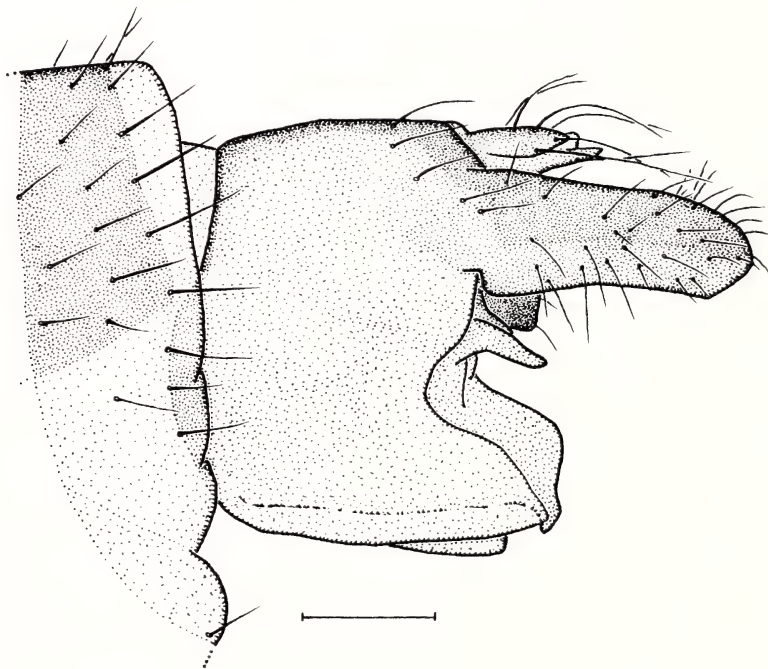


Fig. 1. *Tiphleba inaequalis* male, left face of hypopygium. Scale bar = 0.1 mm.

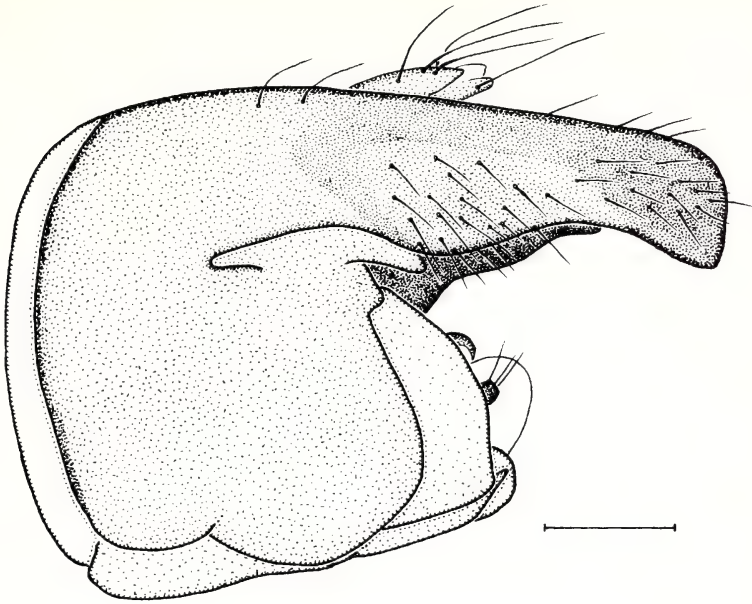


Fig. 2. *Triphleba renidens* male, left face of hypopygium. Scale bar = 0.1 mm.

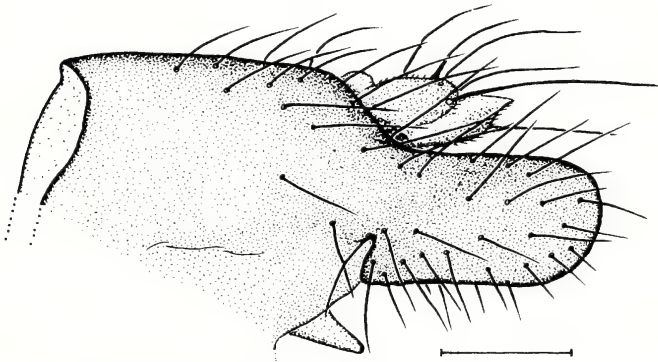


Fig. 3. *Triphleba vitrea* left face of hypopygium. Scale bar = 0.1 mm.

TRIPHLEBA INAEQUALIS SCHMITZ

Triphleba chandleri Disney, 1987: 191. **Syn. nov.**

Schmitz (1943) did not distinguish between the females of *T. vitrea* and *T. inaequalis*, so that lead 1 of his couplet 30 ends with "(? *vitrea* Wood und) *inaequalis* n. sp." He then based his perfunctory description of the female of *T. vitrea* on that of Wood, as he had evidently seen no specimen. By contrast the S7 of the

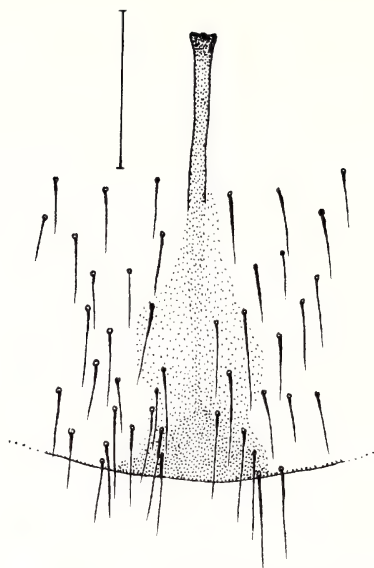


Fig. 4. *Triphleba vitrea* female abdominal sternite 7. Scale bar = 0.1 mm.

female illustrated in our Fig. 4, and identified as *T. vitrea*, is from a specimen in a series of males and females collected on the Malham Tarn NNR in Yorkshire. By contrast, Schmitz's single female attributed to *T. inaequalis* was from Holland, whereas his series of males of this species came from Germany. Furthermore, he reported a series of males of *T. vitrea* from his Dutch locality. Subsequently, a female from Spain which also keys out at Schmitz's couplet 30, was described as new, *T. chandleri* Disney (1987), as its S7 has a narrow posterior projection (Fig. 1 in Disney, 1987). However, this female was collected at the same place and time as two males of *T. inaequalis*. A more plausible explanation of these facts is that Schmitz misidentified a Dutch female of *T. vitrea* as *T. inaequalis*. This in turn caused the true female of the latter to be misidentified as a previously undescribed species, *T. chandleri*. The latter is proposed as a synonym of *T. inaequalis*. Schmitz's Fig. 113f and our Fig. 4 are now considered to be both illustrations of *T. inaequalis*, and the trivial differences are only what might be expected of different specimens drawn by different artists.

ACKNOWLEDGEMENTS

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SHORT COMMUNICATION

The possible introduction to Madeira of the monarch butterfly, *Danaus plexippus* (L.) (Lepidoptera).—I was interested to read the paper by Salmon & Wakeham-Dawson (1999) on Wollaston and the Madeiran butterfly fauna. This prompted me to ask the authors if they were aware of a suggestion that the Monarch, *Danaus plexippus* (L.) might owe its presence on Madeira to a deliberate introduction some 20–30 years ago. They were unaware of this possibility. The facts surrounding the claim are as follows.

Bill and Margaret Beer were a couple of wildlife enthusiasts who, until the 1980s lived at Marlow Bottom, Bucks. They were members of the (now defunct) Middle-Thames Natural History Society and of the Amateur Entomologists' Society. They bred, amongst other things, Monarch butterflies and as they did not like killing any insects, sightings in the area from around 1960–80 may well have been releases.

On one occasion when I visited them I was interested to see Milkweed (*Asclepias* sp.) growing out of cracks in the paving of the patio and flourishing. It was there, Bill explained, as foodplant for the Monarchs and he went on to say during the conversation that he had introduced them to Madeira. I wondered at the time whether this was a good thing but made no comment; I do not think he would have understood my doubts. Later I passed on this information to Denis Owen, an old school friend, who at that time was particularly interested in the butterflies of the Canaries and Madeira.

To ensure that my memory had not failed me I felt it was necessary to confirm these facts with others and have now done so with more or less positive results. Those consulted were all members of the MTNHS and bear out the facts so far. One of these, Victor Scott, a local naturalist, added that Bill certainly claimed to have introduced the butterflies to Andalusia “about 30 years ago”.

A letter from Ron Youngman can be quoted (in part)—“They were a quite remarkable couple and always had something on the go. . . . I certainly remember them talking about their attempts to introduce Monarchs in various places and I remember them saying they had sown Milkweed seeds in southern Spain and on at least one island. I don't recall that it was Madeira. . . . I can certainly say they attempted their introductions before 1981 and almost certainly in the late 1960's or early 1970's”. This too is my recollection of the date and seems likely, since Martin Albertini has established from old AES membership lists that Bill Beer died between 1983 and 1987.

As there would be no point in attempting an introduction to the Canaries, since the butterfly first appeared there in 1880 (Higgins & Riley, 1970), it is suggested that

Madeira must have been the island involved. The Monarch was certainly present on Madeira in 1984 when I visited and larvae were found in Funchal feeding on *Asclepias curassavica* rather than on native species of this family (Owen & Smith, 1989). Michael Salmon (pers. comm.) comments that Owen, Shreeve & Smith (1987) stated that "These might be the first definite breeding records of the Monarch from Madeira". If so, it is just possible that the Beer introduction was successful. However, the most obvious possibility is that the original butterflies migrated from one or other of the Canary Islands. Owen, Shreeve & Smith (1986) suggest that this was the case, as with *Pararge aegeria* and *Pieris rapae*. The Canaries are also the most likely source of the original stock for an attempted introduction. DNA analysis might show whether the Madeiran butterflies originated from there but even confirmation of this cannot show how they arrived. We will probably never know.

This however, is not quite the end of the story because these investigations led me to contact Dr Peter Edwards. He recorded finding a small colony of *D. plexippus* in Spain in 1984 (Edwards, 1984). Three years later he returned to the same area, near Nerja, which perhaps significantly, is in Andalusia. The butterflies were still there (Edwards, 1988) and with two companions he searched for and found *Asclepias curassavica*. It was "widely distributed . . . but nowhere common" and almost every plant had ova or larvae of *D. plexippus*. However, when he returned in 1991 there were no butterflies or larvae to be found. He recalls too, that he heard a story told of an "eccentric Englishman" who had planted Milkweed and introduced Monarchs, though this could not be verified (pers. comm.).

The parallels in timing of the observations in Madeira and Spain are interesting and certainly in Spain seem to suggest that the butterfly became established over a small area for a short time but failed to consolidate its hold, pointing to a failed introduction either by migration or the hand of man. Perhaps things started in Madeira in the same way but ended differently. Furthermore, in conclusion it is worth pointing out that Professor Joachin Baixeras of the University of Valencia states (pers. com.) that "*D. plexippus* has never been considered as a resident in our (Spanish) fauna".

My thanks are due to Dr Michael Salmon to whom my initial enquiry was made and who has helped in various ways with comments and suggestions since then. Also to all those others mentioned in the text and other members of the old Middle-Thames Natural History Society from whom I sought information.—ALAN SHOWLER, 12 Wedgwood Drive, Hughenden Valley, High Wycombe, Bucks., HP14 4PA

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SAND DART *AGROTIS RIPAE* HB (LEP.: NOCTUIDAE) IN GLAMORGAN—A STRANDLINE SPECIALIST

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Abstract. Larval searches for *Agrotis ripae* Hb were carried out on most beaches of West Glamorgan during the autumn of 1999. The results indicated that, although the species was widespread, there were substantial stretches of beach that were not populated. There appeared to be a strong relationship between actively accreting beaches, which supported characteristic strandline flora and fauna, and the presence of sand dart larvae. Local threats to strandline ecosystems are discussed.

INTRODUCTION

Glamorgan is blessed with some of the UK's finest beaches, most of which are backed by extensive dune systems of international importance. Strandlines mark the mobile boundary between dunes and intertidal sands and are characterised by accumulations of seaweed and other organic matter that have been deposited high up the shore by spring tides. This material provides the nutrients upon which a number of specialist plant species thrive, notably prickly saltwort (*Salsola kali*), sea rocket (*Cakile maritima*) and species of *Atriplex*. These in turn provide food and a habitat for one of Glamorgan's most specialised moths, the sand dart (*Agrotis ripae*). The sand dart is classified by Waring (1999) as a Notable/Nb species due to its restricted distribution. It is strictly coastal, occurring only on sand dunes and occurs as far north as Aberdeen. In Glamorgan, the species was first noted at Neath in 1866 (Llewellyn, 1866). Hallet (1917) then listed records for Port Talbot, Penarth and Porthcawl prior to 1917 and Rothamsted surveys carried out during the late 1970s at Oxwich and Whiteford also produced records of the species (Hughes, M.R., unpublished data). Thus it is evident that the species has long been established and is probably to be found on most of the county's dune systems.

Tutt (1994) stated that "*beneath the plants of Atriplex littoralis and Salsola kali the larvae of Agrotis ripae may be obtained in large numbers . . . They are best obtained from the middle to the end of August, when they are nearly full-grown, and can generally be found simply by passing the fingers through the sand*". Fig. 1 shows a full-grown larva obtained by this method. This useful advice enabled the author to conduct a survey of most of the beaches within West Glamorgan during a relatively short period of time in autumn 1999, brief details of which are described below.

A total length of approximately 21 km of dune/beach interface was examined with each stretch being categorised as accreting, stable dune cliff or eroding. Where beaches were found to be eroding, there was no strandline flora, those that were stable occasionally supported populations of the known foodplants, and those that were accreting always supported some foodplant species. These were then sampled as described by Tutt (1994) and larval presence/absence was noted. As one of the main objectives of the survey was to record the current distribution of the species, the 1km squares of the National Grid were used as sampling units. Fig. 2 shows the results of the survey, with larval records being represented by square symbols. All other records predate the survey and are of adult moths, which are shown as circles. Those recorded before 1980 are depicted as open circles. Figure 2 also shows those beaches that were sampled and the erosional/depositional state of each is indicated. Larval distribution was found to be closely associated with actively accreting beaches.

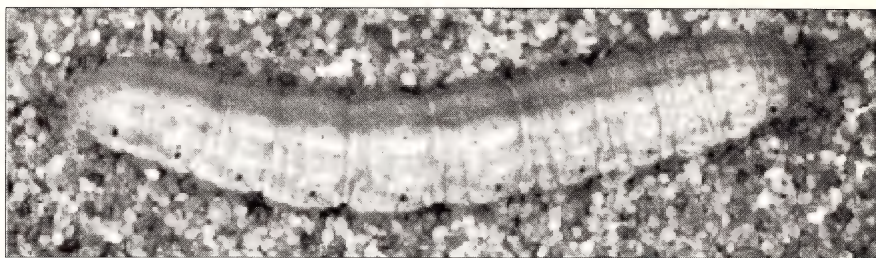


Figure 1. Sand dart—Final instar larva.

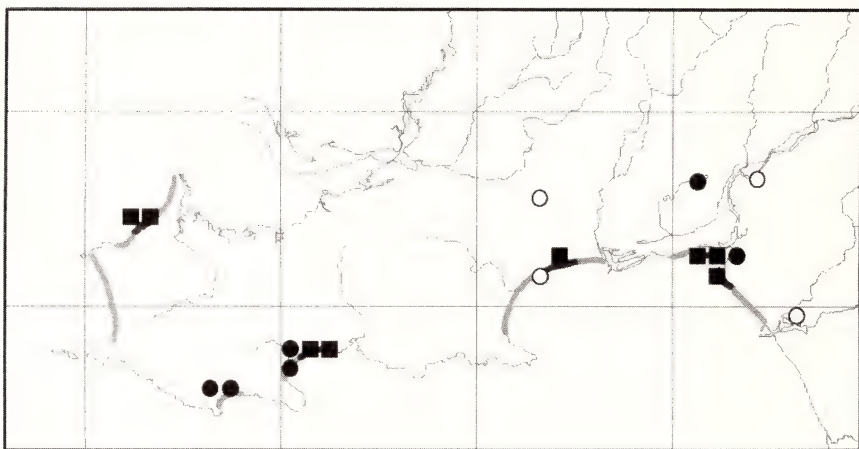


Figure 2. Distribution of sand dart on the Gower Peninsula (square symbols = larvae, round symbols = adults, open circles = pre 1980) and beaches covered by survey (grey = stable dune cliff or eroding dune, black = actively accreting dune).

There has been much concern in recent years over the effects that beach-cleaning operations have on the native flora and fauna of the strandline, and also how such operations may be affecting natural processes. Some evidence suggests that the removal of organic debris prevents the natural development of embryo dunes which provide a natural defence to winter storms. Furthermore, in addition to supporting unique communities of plants and animals, they also form the first stage in dune succession and prevent over-stabilisation, a common problem in many areas.

The sand dart could be described as literally living on the edge of the terrestrial environment and is well adapted to great environmental stress. However, the mandatory standard of the Bathing Directive 76/160/EC, and the prestige of gaining a 'Blue Flag Seaside Award', is resulting in an increase in the number of local authorities undertaking mechanical beach-cleaning operations. This may be one of the greatest threats to date for the sand dart and other co-inhabitants of the strandline, but there is optimism.

Following a period of extensive mechanical beach-cleaning operations within Swansea Bay (SSSI), which resulted in the virtual extinction of many strandline invertebrates (Llewellyn, 1996), these operations were replaced by hand-cleaning

methods during 1999. This enabled small populations of sea rocket and prickly saltwort to colonise areas where residual algal deposits were left undisturbed. The result was that sand dart larvae recolonised almost immediately and were found to be abundant, even in areas where only a few plants had colonised the strandline.

However, such rapid recolonisation is only likely to occur where there are extant populations close by, in this case the population at Crymlyn Burrows undoubtedly facilitated rapid recolonisation. This example does demonstrate that with sympathetic management, it is possible for local authorities (and other land-managers) to accommodate both human interests and those of the strandline fauna without compromising health and safety, tourism and other key issues. Sensitive areas elsewhere in the UK should be identified and damaging activities minimised if sustainable populations of the sand dart and other scarce species are to remain features of our beaches.

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SHORT COMMUNICATION

More observations of dotted chestnut moths.—I recently reported finding adult dotted chestnut moths, *Conistra rubiginea* D & S., in the nest of the ant *Lasius fuliginosus* (Latr.) (Formicidae); see Denton (1998. An unusual encounter with dotted chestnut moths *Conistra rubiginea*. *British Journal of Entomology and Natural History* **10** (4): 209). I revisited the same nest on Thursley NNR, Surrey on 4.ix.1998, and found two lepidopteran pupae next to the nest carton, c.40 cm below ground inside the base of a hollow oak. I took these home and adult *C. rubiginea* emerged on the 25. & 29.ix.

L. fuliginosus is a fairly large ant, but workers rarely bring large insects to the nest. However, it does defend its nest against intruders, and the caterpillars must have a way of pacifying or avoiding the workers on their way down into the nest. The adults found within the nest in 1997 were completely ignored by the ants, which were agitated by my presence.

Further investigation of this colony in 1999 revealed several old pupae deep in the nest chamber but no evidence of larvae. The caterpillars of *C. rubiginea* are very hairy, unlike others in the genus and it is tempting to suggest that it might be myrmecophilous, as its range is within that of *L. fuliginosus*. Both favour woodland, and wooded heaths. In captivity the larvae are not very fussy about their food plant, and will eat withered leaves. Perhaps the caterpillar is somehow protected by the ants, which offsets the need for a continual supply of fresh vegetation. It is surprising that others, especially the arch ant-nest investigator Horace Donisthorpe, didn't come across this moth in the many nests examined across the country.—JONTY DENTON, 2 Sandown Close, Alton, Hants GU34 2TG

BENHS INDOOR MEETINGS

8 February 2000

The President, Mr S. MILES announced the death of the lepidopterist, Mr S. H. Church.

Dr P. WARING, Mr I. MENZIES, Mr R. KEMP and Mr S. MEREDITH provided some display cases of moths and other insects collected during BENHS expeditions to Belize.

Mr R. SOFTLY circulated a copy of The London Biodiversity Audit, Volume 1, which will be given to London's Mayor when elected. The responsibilities of the elected mayor include producing plans for London's transport, waste disposal and biodiversity. The Biodiversity Audit has been produced by the London Natural History Society and it describes habitats in London and species requiring action. A second volume is being prepared on actions that can be taken to maintain and enhance London's biodiversity.

The following persons have been approved as members: Mr A. O. Beaumont, Mr E. J. Cooper, Mrs E. L. Forbes-Dale, Mrs Y. C. Golding, Mr S. M. Hewitt, Mr J. Hollingdale, Mr D. E. Marriott, Dr R. M. Smith, Mr R. G. Smith, Mr B. Stewart and Mrs A. H. Tait. The Tullie House Museum, Carlisle, has become a Corporate Member.

Dr I. MCLEAN read a communication passed to him by Mr A. E. Stubbs. This stated that on 19.i.00 Mr Stubbs had seen three queen bumblebees, *Bombus pratorum* (L.) visiting the flowers of winter-flowering honeysuckle, *Lonicera fragrantissima*, in his garden in Peterborough, Cambs. At the time there was a chilly NE wind with low sun at 12.35 pm; the shade temperature was 6 °C. At least one bee remained active 20 minutes after the sun had clouded over. Subsequently the bees have been seen regularly, especially when sunny. On 21.i.00, two hibernating hoverflies, *Episyrphus balteatus* (Degeer) and *Eristalis tenax* (L.), were also seen in his garden during warm weather.

Mr A. J. HALSTEAD reported that the leaf-mining fly, *Phytomyza hellebori* Kaltenbach, reported by Mr Stubbs at the previous meeting as new to Britain, was also present at Royston, Herts. (VC29, Cambs.) and at the RHS Garden, Wisley, Surrey. At both sites the mines were in the foliage of *Helleborus foetidus* and no mines have been found in other types of *Helleborus* growing at Wisley.

Mr R. SOFTLY said that at a recent London Natural History Society meeting several members had reported early frog activity with one garden pool already having frog spawn. Dr P. Waring had noted active frogs in Peterborough on 5.ii.00, with one pair in amplexus, but no spawn as yet.

Mr R. D. HAWKINS said that Dr P. Costen had informed him that he had had at his light trap in St Peters, Guernsey, a silver Y moth, *Autographa gamma* (L.) on the morning of New Year's Day and a light arches, *Apamea lithoxyla* (D. & S.) on the following night.

Dr P. WARING, Mr R. KEMP, Mr S. MEREDITH, Mr I. MENZIES, Mr N. HALL gave a joint presentation on the BENHS expeditions to Belize that took place in January–February 1996, May 1997 and December 1998. Field meetings are an important activity of the BENHS and in his role as the Society's Field Meetings Secretary Dr Waring has sought to extend the geographical spread of meetings to cover all of Britain. In his Presidential Year in 1995 he proposed an expedition to Belize, formerly British Honduras, in Central America. Belize was chosen as it is politically stable, has a pro-conservation stance and it was logistically feasible to organise an expedition. Belize is on the east coast of Central America, between

Mexico and Guatemala, and it is about the size of Wales. It has an insect fauna which is a mixture of North, South and Central American species.

The aims of the expeditions were as follows: 1. To study the butterflies, moths and other insects, with the specific aims of compiling systematic lists for conservation sites and to investigate species associated with different types of habitat and management systems. 2. To raise the profile of insects and their conservation in Belize. 3. To provide BENHS members with experience of neotropical insects. 4. To develop links between the BENHS and conservationists in Belize.

No expedition is planned for 2000. The current need is to work through the material already collected and to publish the results. Sets of photographs of named set specimens have been prepared for the benefit of local entomologists and site managers in Belize.

Mr R. KEMP showed a video, mainly taken during the 1998 expedition. This showed the habitats visited and examples of some of the butterflies and moths seen during the day or attracted to light. Mr S. Meredith described some of the butterflies that had been recorded. Mr I. Menzies gave an account of the other orders, including the Coleoptera, which is his particular interest. Relatively few beetles were seen by day and most of his collecting was done at light. He had collected about 60 species of which he had so far named about one-third. Hemiptera and Orthoptera were present in large numbers with many species. Mr N. Hall spoke on his experiences of light trapping moths in Belize. He noted that the number of moths coming to light fell rapidly as the moonlight increased in intensity. A light shower of rain, however, would stimulate the flight activity of moths and boost the numbers taken at light.

14 March 2000

The President, Mr S. MILES announced the death of the lepidopterist and past President of the Society, Mr B. R. Baker.

Mr A. E. STUBBS showed some dipterous larvae found in molehills in grassland by the River Nene at Stanground, Peterborough, Cambs. on 13 March. These were two crane-fly larvae or leatherjackets, *Tipula vernalis* Mg. and *T. paludosa* Mg., and a snipe-fly larva, *Rhagio tringarius* (L.). The latter is an active predatory larva which rapidly subdues its prey with venom. The tipulid larvae have distinctive six-lobed spiracular discs on their rear ends while *R. tringarius* has a four-lobed disc.

Mr R. A. JONES showed a specimen of the chloropid fly, *Camarota curvipennis* (Latr.), swept from a relic area of old chalk downland at Saltbox Hill SSSI, Biggin Hill, Kent (TQ409605) on 13.x.99. It develops in the heads of wheat, rye and barley and was once considered a minor pest but it has become less common in recent years. This tiny fly is easily recognisable because of the unusual form of the antenna, which bears a large, hirsute, blade-like arista.

Dr D. HACKETT showed a specimen of the uncommon tephritid fly, *Chetostoma curvinerve* Rondani. This was taken in his garden in London N8 on 9.iii.00. This is the first record for Middlesex; most records have been from Surrey and Sussex.

Mr A. J. HALSTEAD showed a nest box for solitary bees he had constructed from recycled materials. The outer box was made from pallet wood and contained 144 cardboard tubes of approximately 10 mm internal diameter and 90 mm depth. These tubes were taken from a large display firework of the roman candle type (a "Sky Monkey With Exploding Coconuts") which was let off at New Year's Eve. This should provide a home for some of the larger tunnel-nesting bees such as *Osmia rufa* (L.) and *Megachile* spp. Other members with access to the organisers of 5 November displays might like to put in a bid for the leftovers to make similar nest boxes.

The following persons have been approved as members: Dr Christopher Betts, Mr John F. Harper, Mr Adrian T. Hine, Mr John Kramer, Mr Allan G. Lawson, Mr Paul Talbot, Mr Maurice Waterhouse, Mrs Imogen S. H. Wilde and Mr David B. Scott.

Mr S. MILES reported that the early spring bees *Anthophora pilipes* (F.) and *Andrena bicolor* F. were active in his garden at Ashford, Middx.

Dr J. MUGGLETON reported a comma butterfly in his light trap at Staines, Middx. during the previous week.

Dr D. HACKETT noted that the hoverflies *Eristalis tenax* (L.), *Episyrphus balteatus* (Degeer) and *Meliscaeva auricollis* (Mg.) were active in his garden.

The Ordinary Meeting was then followed by the Annual General Meeting and the Presidential Address, after which the new President, Eric Philp, thanked his predecessor and closed the meeting.

11 April 2000

The President, Mr E. PHILP, announced the death of a former member, Mr G. Harris.

Mr A. J. HALSTEAD showed a piece of old bone found on the bank of the River Wey at RHS Garden, Wisley, Surrey. The bone had been extensively gnawed, probably by grey squirrels judging by the size of the teeth marks. Mr M. J. BLECKWEN thought the bone exhibited might be part of the ulna of a horse.

Mr A. S. STUBBS read a statement on behalf of the Joint Committee for Conservation of British Invertebrates (JCCBI) executive which had been considering The Countryside and Rights of Way Bill. A Green Paper was published on 3.iii.2000 and is currently at the committee stage. This legislation, which embodies the government's "Right to Roam" policy, will affect approximately 1150 square kilometres of land and could have profound effects for the study and recording of invertebrates. Taken literally, schedule 2 could prevent the taking of any specimens or the carrying of collecting equipment on land covered by the legislation. The JCCBI executive is drawing its concerns to the attention of other organisations with an interest in biological recording. It is also contacting the chairman of the national wildlife agencies to point out the difficulties that could arise from the proposed legislation. The Department of Environment, Transport and Regions is also being approached with a request that guidelines be issued to make clear that schedule 2 is not intended to unreasonably obstruct biological recording that may require the collection of voucher specimens for identification purposes.

Mr Stubbs also reported that work towards establishing an Invertebrate Conservation Trust was progressing. It will soon be necessary to appoint trustees and form a committee. Anyone interested should contact Mr Stubbs.

Dr J. MUGGLETON read an email received from Mr R. A. Jones. He had seen a humming bird hawkmoth examining the sun-lit wall of his house at East Dulwich, London, SE22 on 1.iv.00. He also saw a speckled wood butterfly in his garden on 2.iv.00. Mr Jones referred to the chloropid fly, *Camarota curvipennis*, he had shown at the 14.iii.00 meeting. He had since identified another specimen taken on 7.vi.99 at Hutchinson's Bank, Surrey (TQ382616). Although only a few kilometres from the other site at Saltbox Hill, it is in another vice-county.

Mr MARK PARSONS spoke on the action for threatened moths in the UK project. A full report of this project and opportunities for participation by BENHS members has been published in the Society's Journal (volume 13, part 1, pp. 57-66).

9 May 2000

The President, Mr E. PHILP, announced the death of the lepidopterist, Mr H. G. Short.

Mr E. PHILP showed a live male specimen of the psychid moth, *Epichnopteryx plumella* (D. & S.) which had been taken in flight at Sandwich, Kent.

Dr M. TELFER showed some live beetles collected from Monks Wood NNR, Cambs. These were two *Diaperis boleti* (L.) (Col: Tenebrionidae), tapped out of *Piptoporus betuleti* bracket fungus on a silver birch on 9.v.00, and *Grammoptera ruficornis* var. *holomelina* Pool (Col: Cerambycidae) from hawthorn blossom on 8.v.00.

The following persons have been approved as members by Council: Dr Rebecca A. Barrett, Mr M. P. Gilbert, Mr Malcolm Jennings, Mr Mark Read, Dr Adrian Wander and Mr Duncan Williams.

Dr J. MUGGLETON announced that the recent Council meeting had considered the Society's subscription rates. The current rates are not covering the costs of running the Society and so from 1 January 2001 the rates will be £15 for ordinary members, £5 for junior members and £300 for life members.

Mr G. MAXWELL had noted the pyralid moth, *Pyrausta aurata* (Scop.) on the wing at the Royal Botanic Gardens, Kew, Surrey.

Dr MARK TELFER spoke on developing the activities of the Biological Records Centre with the National Recording Schemes. BRC was established in 1964 and is based at Monks Wood, Cambs. It collates and computerises biological records in order to compile national distribution atlases. It currently has over 11 million records of over ten thousand plants and animals. Many of these records have been provided by amateur recorders and there has been a big increase in recording during the 1990s. BRC currently manages 66 recording schemes.

The traditional role of BRC has concerned data entry and validation, with the data being stored in secure electronic and paper archives. BRC also disseminates information through the production of atlases, newsletters and by responding to specific requests for data. The organisers of recording schemes are typically responsible for collecting and collating records, providing taxonomic and ecological expertise, communication with scheme members, and writing the text for atlases. Increasingly, schemes are taking on the role of computerising records and managing their own databases.

In 1995 National Biodiversity Network was established. This aims to link the various organisations and individuals involved in biological recording and to promote standardised methods of recording and storing data. Pilot studies with dragonflies, carabid beetles and bryophytes are underway to produce interactive distribution maps that can be accessed through the world-wide web. Information on NBN projects can be obtained from www.nbn.org.uk

Dr Telfer described how the role of the BRC is likely to develop. There are currently 56 invertebrate recording schemes, of which 46 cover insects. He wondered if there were too many separate schemes. There are economies of scale that can be achieved by bringing schemes together, where tasks can be shared and duplication of effort avoided. Progress in this direction has been made by the Dipterists' Forum and the Bees, Wasps and Ants Recording Society (BWARS). The myriapod and woodlice schemes are also coming together. There could be scope for recording schemes that are based on habitats, such as aquatic insects, or on recording methods, such as light trapping.

As an example of a successful and highly self-sufficient recording scheme, Dr Telfer referred to the Dragonfly Recording Network. This began as the BRC

Odonata Recording Scheme and spawned the British Dragonfly Society about 20 years ago. An atlas was produced in 1996 and the Society now has about 1500 members. It produces a regular newsletter and spreads the workload of collating records by having a regionalised recording network. It manages its own database and has customised recording software that is compatible with Recorder 2000, allowing the DRN to produce its own maps and analyses of data. They are now the prime source of information on dragonflies and their conservation in Britain. The database allows them to monitor changes in dragonfly populations and supply data for research, conservation and education.

BRC will continue to evaluate, support and strengthen recording schemes, to enable them to contribute efficiently to studying and conserving invertebrates. An application for funds is currently with the Heritage Lottery Fund. If successful, individual recording schemes will be able to apply to HLF for this funding.

13 June 2000

Mr R. A. JONES showed a specimen of *Otiorhynchus setosulus* Stierlin (Coleoptera: Curculionidae) beaten from a small cherry tree at Elm Park (TQ526858), South Essex (VC18) on 5.vii.99. It is a member of the subgenus *Arammichnus*, characterised by the strongly broadened and rounded apices to the front tibiae. There are two very local native members of the subgenus, *O. atroapterus* (Degeer) and *O. ligustici* (L.), but *O. setosulus* is a Sicilian endemic species. This is apparently the third British specimen, both others having been taken in West Kent during the 1990s.

Mr E. PHILP showed two RDB3 ground beetles (Coleoptera: Carabidae) taken at the BENHS field meeting at Shorne Marshes, Kent on 3.vi.00. These were *Amara strenua* Zimm. and *Anisodactylus poeciloides* (Steph.). Both are very local salt-marsh species with most recent records being from the Thames Estuary.

Mr A. STUBBS showed some insects recorded during the BENHS field meeting at Redgrave and Lopham Fen on the Suffolk/Norfolk border on 10.v.00. These were: (a) a male *Crabro scutellatus* (Scheven) (Hymenoptera: Sphecidae). This solitary wasp has characteristic enlarged male fore tibiae. (b) A notable sciomyzid fly, *Colobaea bifasciella* (Fall.), taken by sweeping short sparse herbage at the Fen. (c) A soldier fly, *Oxycera rara* (Scop.). (d) A live larvae of a therevid fly, possibly *Thereva nobilitata* (F.). These predatory larvae live in sandy soils and detect prey walking over the surface. This is seized from below, injected with a highly toxic poison and dragged into the soil.

Mr S. MILES made available for inspection a copy of a pamphlet on biodiversity produced by The Wildlife Trusts, entitled "Beauty of the mini-beasts".

Dr J. MUGGLETON reported taking a large yellow underwing moth, *Noctua pronuba* L. at light in his garden at Staines, Middlesex on the very early date of 12.v.00.

Mr R. A. JONES reported an early sighting of the stag beetle, *Lucanus cervus* (L.) at Dulwich on 25.v.00. Mr Miles had also seen one at Ashford, Middx.

Dr TIM SPARKS spoke on "The changing phenology of the UK—is spring getting earlier?" The simple answer to the question is yes and this is supported by a number of long-term studies of plant and animal activities. These have been made by a variety of individuals, either acting alone or contributing to larger schemes, such as county bird reports. Other long-term recording schemes have been organised by professional bodies such as Rothamsted Experimental Station, with its aphid and moth surveys, and the Royal Meteorological Society. Britain has a long record of nature recording and the most remarkable example is the Marsham family who made

annual records on the family estate in Norfolk between 1758 and 1958. Robert Marsham began the sequence by selecting 27 indications of spring, such as leafing and/or flowering dates of plants. Of the 27 indicators chosen, hawthorn leafing seems to be the most responsive to temperature change.

Other organisations and individuals have made records for shorter periods. The Royal Meteorological Society produced an annual publication called *The Phenological Report* between 1875–1947. This compiled the records of up to 600 recorders who noted the first date for various plant and animal events. Jean Combes of Ashted has recorded the leafing dates for ash, horse chestnut, lime and oak between 1947–1999. Her records show that oak is now leafing in early April instead of late April when she started recording. Mary Manning has recorded flowering dates of woodland garden plants near Norwich between 1965 and the present time. Winter aconite is now flowering about one month earlier.

The UK Phenological Network was re-established in 1998 to encourage more recording. A list of easily recorded spring events has been drawn up, some of which are the same as those recorded in older surveys. An autumn scheme is also being drawn up.

The speaker would be pleased to hear from anyone who has phenological records of a current or historical nature. Further information about the UK Phenological Network can be obtained from the internet at www.nmw.ac.uk/ite/phenology

BENHS FIELD MEETINGS

West Walk, Hampshire, 6 June 1998

A BENHS Conservation Working Group meeting

Leader: **Stephen Miles**.—The Forest of Bere (Forest Enterprise), Hampshire comprises deciduous woodland and coniferous plantation with stream-side vegetation. The main objective was to facilitate further recording on this site, which at one time was regarded as potentially quite an interesting area. It appears to have been little visited by entomologists recently. The visit followed from a request I sent to Roger Key of English Nature in 1997 seeking a list of sites from which further information was desired, my intention being to give my BENHS field meeting site visits a more definite purpose.

The day meeting commenced at 11 a.m. at the public car park at SU596122. As well as the leader, there were two other members and one non-member, Ruud Schilder from Holland, who was a student of African hawkmoths at the Natural History Museum at Kensington. In reasonably bright weather with sunny periods good numbers of species were obtained, although no very significant ones were reported by either Andrew Halstead or Peter Chandler. The most exciting event was the observation of the crane fly *Tanyptera nigricornis* (Meigen) by Peter on a fallen tree; however he failed to secure it in the net! Ruud found the carabid beetle *Cychrus caraboides* (L.) under a dead log in the larch plantation; this feeds on snails by popping its narrowed head and thorax into the snail's flesh at the opening of its shell.

A *Brachyopa* sp. fly was seen hovering beside a medium-size beech tree where it had had branches sawn off to allow horses to pass on the adjacent path; this was yet another specimen that "got away". The common fly *Tachypeza nubila* (Meigen) was also seen on the bark. Peter Chandler identified the sciomyzid fly *Trypetoptera punctulata* (Scopoli) nearby, and beside a log pile a female of the local woodland hoverfly *Volucella inflata* (Fab.) landed on him. *V. bombylans* (L.) was also present,

as were other typical deciduous woodland flies such as *Ferdinandea cuprea* (Scopoli) and *Chalcosyrphus nemorum* (Fab.). A single *Rhagium mordax* (Degeer) (Col: Cerambycidae) was also seen on *Rubus* leaves.

Peter Chandler provided a list of 77 other flies including 22 mycetophilids; however he remarked that none were significant! Andrew Halstead provided a similar but multi-order list which included 29 sawfly species recorded as adults and the following four species from larval evidence: *Blennocampa pusilla* (Klug) leaf rolls on *Rosa* sp., *Phymatocera aterrima* (Klug) on solomon's seal *Polygonatum multiflorum* (L.), *Nematus pavidus* Lep., subsequently reared out from a larva in *Salix* sp., and similarly *N. lucidus* (Panzer) bred from a larva on hawthorn.

Finally, a good specimen of the stinkhorn fungus *Phallus impudicus* (L.) was seen growing appropriately, adjacent to the men's toilets in the car park!

The evening meeting appeared initially to be threatened by rain, as having kept off all day a shower commenced just as members started arriving. However, once we were in position behind the locked gates, it remained dry with only occasional glimpses of the moon. The MV, actinic and other traps employed by the three members and one non-member soon revealed some of the woodland speciality moths for which this wood was well known in the days when "A Survey of the Insects of The Forest of Bere" was produced by David Appleton, Richard Dickson and George Else, covering historic records on this site up to those recorded in the 1970s. In total, four of the beautiful scarce merveille du jour *Moma alpium* (Osb.) moths were taken at light. Other significant species of the at least forty-eight taken included the little thorn *Cepphis advenaria* (Hüb.), orange footman *Eilema sororcula* (Hufn.) and the rosy marbled *Elaphria venustula* (Hüb.). This last species, presumed to be a recent colonist, has occurred at this site since the 1970s.

I am indebted to John Phillips for providing me with his list of the moth species taken. It is regrettable to record that of the two other individuals running lights, no records of what they took were received by the leader. I hope this is not a trend that will disadvantage all leaders of field meetings in future when writing their reports for this journal. Thanks are also due to the authorities at the Forestry Commission at Alice Holt, Hampshire for giving permission for the meeting to take place.

New Forest, Hampshire, 22 August 1998

Leader: **David Green.**—The now traditional August field meeting in the New Forest was well attended, with members and guests coming from as far afield as Queensland, Western Australia. Although the primary objective of the meeting was to search for the two crimson underwing moths *Catocala sponsa* (L.) and *C. promissa* (D. & S.), the meeting was also supported by several dipterists and coleopterists. This was a joint meeting between the BENHS and Butterfly Conservation.

During the afternoon, the party explored one of the night's selected trapping areas at Whitley Wood (SU2905). It is encouraging to see how much dead timber has been left in this part of the Forest and particularly the number of standing dead trees. Several notable species of Coleoptera and Diptera were located although very few Lepidoptera were found during this part of the meeting, either as adults or as larvae. The only butterflies seen were a few speckled wood *Pararge aegeria* (L.), meadow brown *Maniola jurtina* (L.) and holly blue *Celastrina argiolus britanna* (Verity). Larvae included mottled beauty *Alcis repandata* (L.) beaten from oak *Quercus robur* L. and common wave *Cabera exanthemata* (Scopoli) from sallow *Salix caprea* L.

The most noteworthy discovery of the afternoon was a single female specimen of the crane fly *Ctenophora ornata* Meigen found by Elizabeth Trasenster and

determined by John Chainey and Alan Stubbs. The species (Fig. 1) is a large and spectacular hornet mimic and is classified UK RDB 1 (Endangered). According to Falk (1991) (Falk, S. 1991. *S. A Review of the scarce and threatened flies of Great Britain, Part 1*. NCC, Peterborough), *C. ornata* has only been recorded from five post-1960 sites, three of them in the New Forest. There have subsequently been at least two additional New Forest records from the Brockenhurst area during the 1990s. Whitley Wood appears to be a new locality. The species is restricted to ancient broad-leaved woodland and has been reared from wet 'porridge' wood mould in a beech *Fagus sylvatica* L.. Old trees and stumps of particularly large girth are considered to be probably essential for this species. Adults have been recorded from June to August and have been taken at moth traps at night and in the vicinity of old, living oaks *Quercus* spp.

Further members and guests arrived for the evening part of the meeting. Some elected to work the well known areas around Whitley Wood whilst others chose relatively less well worked sites elsewhere. It proved possible to cover four widely spaced localities: Whitley Wood, Gritnam Wood (SU2806), Mark Ash Wood (SU2407) and Anses Wood (SU2212). Anses Wood, in particular, is in a hitherto very under-recorded part of the Forest.

As so often in 1998, weather conditions were not particularly favourable for night work with clear skies and rapidly falling temperatures. Two dark crimson underwing *Catocala sponsa* and two light crimson underwing *C. promissa* came to sugared tree trunks at Whitley Wood but none were located at any of the other trapping areas. Most members reported disappointingly low numbers of moths although the meeting did provide a useful opportunity to gather records which can be used in the compilation of the forthcoming New Forest Special Area for Conservation (SAC) Management Plan presently under preparation. All records have been forwarded to Forest Enterprise and to Barry Goater, the County moth recorder.

Forty-nine species of macro moth were recorded. Most were common species associated with deciduous woodland, although a trap situated on the very edge of



Figure 1. The crane fly *Ctenophora ornata*, photo. P. Waring.

Anses Wood additionally attracted a range of characteristic heathland species. The only moths of note other than the two underwings were a single vestal *Rhodometra sacraria* (L.) at Anses Wood and a mocha *Cyclophora annulata* (Schulze) at Whitley Wood. The vestal was of the strongly marked form with a bright pink stripe on the forewings. This may be an indication of local breeding.

Unexpected visitors to light traps in Anses Wood were three further specimens of *Ctenophora ornata*. These were all males and were determined by John Chainey. This is another area with an important resource of standing dead timber and this discovery results in a second new locality for this species.

I would express my gratitude to all those who supported this field meeting. I would particularly like to thank Paul Waring for invaluable advice and assistance on the day. I would also like to thank English Nature and the Forestry Commission for permission to hold this meeting. The Forestry Commission are keen to encourage as much recording of insect orders in the New Forest as possible. Permits for the collecting of Lepidoptera can be obtained from David Green at Butterfly Conservation, Manor Yard, East Lulworth, Wareham, Dorset, BH20 5QP and for the collecting of other orders from the Forestry Commission, Queen's House, Lyndhurst, Hampshire, SO43 7AB.

Slapton Ley, Devon, 11 September 1999

Leader: **Roy McCormick**.—The weather looked quite promising as two members of Devon Moth Group and I started out for the meeting place at Slapton Ley Field Study Centre. As we approached the area it started to drizzle and by the time we had arrived at around 19.20 this was more persistent. Two other Members of DMG were already at the meeting place with a third arriving shortly afterwards; we decided to hold on until 19.45 in case anybody else turned up and discussed our options about what we were going to do. We moved on to the site where the lights were to be run and met a further person who had decided to brave the night.

The drizzle had now turned to rain, albeit not very heavy but dense; the type that gets you wet through in no time. I had seven traps on board belonging to myself and the people who travelled with me but because of the weather, it was decided to put out the first two that came to hand along with the first generator; lucky that most of our equipment is standard as we had traps from one member with the generator of another and a mixture of reels from two of us. The traps were put out and we looked like drowned rats by the time we had finished, but the generator was started and we were under way. The rain persisted but we did a couple of rounds of the two traps (they were a good distance apart) and we managed to record more moths than there were people. By around 22.00 the rain finally stopped and our tally had reached 27 species with the only thing of note being *Parapoynx stratiotata* (L.) (ringed china-mark) which had been recorded from Slapton before.

It was agreed that as the night was poor, we would start packing up around 23.00 but at around 22.30 a moth was spotted sitting on the outside of the nearest trap. This was quickly tubed and examined and at first thought was identified as *Idaea degeneraria* (Hüb) (portland ribbon wave). But in September and a mile or two from the type of habitat it is usually found at? The two who were waiting at the Field Study Centre when we arrived, decided that they had had enough so we said our good nights to them; they had had an enjoyable evening and seen moths they had not seen before. The tubed specimen was taken home by me and confirmed as *degeneraria*; it was a bit small but it matched the specimens I had in my cabinet; what

would we do without reference collections? The moth is a female and I am going to try and breed from it; we shall see!

We finished up with 30 species including a few Tortricidae and Pyralidae, with the best of these: one *Olindia schumacherana* (Fab); three *Endothenia quadrimaculana* (Haw); five *Parapoynx stratiotata* (L.) (ringed china-mark); one *Idaea degeneraria* (Hüb) (portland ribbon wave); three *Epirrhoe galiata* (D. & S.) (galium carpet) and one *Gortyna flavago* (D. & S.) (frosted orange). The temperature as we packed up was 16°C.

Shorne Marshes & High Halstow, Kent, 3 June 2000

Leader: **Eric Philp**.—This two part meeting was blessed with fine sunny weather. Six members met at the entrance to the new RSPB reserve on Shorne Marshes and slowly worked their way towards the Thames shore, recording along the side of the track and over the grazing marshes. Care was needed in walking over the grazing fields as they were quite wet in places and the route out was often deeper than the route in, so that most present experienced wet feet at times. The party returned to base for lunch and, with pooled knowledge of the area, returned to the marshes for the rest of the afternoon. With arachnologists in the majority it was not surprising, and very pleasing, to have a total of 69 species of spider recorded. These included *Enoplognatha mordax* (Thorell) (Notable A), *Meioneta simplicatarsis* (Simon) (Notable A) and *Zilla diodia* (Walckenaer) (Notable B). Among the four species of Odonata recorded it was nice to see a good number of the scarce emerald damselfly, *Lestes dryas* Kirby (RDB 2), on the wing. Amongst the Coleoptera recorded were *Amara strenua* Zimmermann (RDB 3) in quantity, *Anisodactylus poeciloides* (Stephens) (RDB 3), *Malachius vulneratus* Abeille (RDB 3) and *Bagous tubulus* Caldara & O'Brian (RDB 3).

The evening part of the meeting was at a further RSPB reserve, a few miles to the east, at High Halstow. At the 6 p.m. start the leader found himself alone and contented himself with collecting around a pond and along the edge of the wood. The weevil *Magdalis armigera* (Fourcroy) was abundant on some dead elms and the minute water-cricket *Microvelia pygmaea* (Dufour) (Notable B) was found by the pond. At the appointed 'light-trap' time, two stalwart members arrived and seven MV light-traps were set up. No great rarities were found amongst the 84 species of Lepidoptera recorded, but these did include the sloe pug *Chloroclystis chloerata*, the lobster moth *Stauropus fagi* and cream-spot tiger *Arctia villica* (L.) as well as four common species of hawkmoth.

The records obtained during the day have been passed onto the RSPB to help with their management of these reserves, which are now being run for the benefit of all wildlife.

Newton Abbot Racecourse, Devon, 9 June 2000

Leader: **Roy McCormick**.—A member of Devon Moth Group and I arrived at the car park at around 20.00; one other member of DMG, who was also a member of Butterfly Conservation Devon Branch, turned up. We waited until 21.00 before driving to the place where we were going to run the lights; the two members assisted me to place the four traps and the generator was started. The night was moderately warm with a clear sky and little or no wind; the temperature stayed around 12°C going down to 10°C by the time we left. Species started to come in but numbers were low; a few rounds of the traps were carried out but by 23.00 it was obvious it was

going to be a poor night so we decided to set up the two traps that were to be left on all night; these were modified 'Skinner Traps' with a special top that made them into Robinson-like traps; these have worked very effectively in the field before with very little getting out. By the time we had left at around 23.30 the total count of species was only ten (10) with not one of these that could be rated as good. The following morning at around 09.00 the DMG member, who came the night before, and I emptied the two traps at the Racecourse; they had not long gone out as the chokes were still warm but the only addition to the count was one *Eligmodonta dromedarius* (L.) (iron prominent) and one *Diarsia mendica* (Fab.) (ingrailed clay). Specimens from this Meeting were taken to be shown, alive, at the 'Creepy Crawly show' that was being held that day (10.vi.2000). I had already emptied two other traps that morning, one in my own garden at Teignmouth and the other at Holcombe; out of all four traps I recorded only 14 species with the numbers of specimens very low; all in all an exceedingly poor night.

Buckfastleigh, Devon, 17 June 2000

Leader: **Roy McCormick**.—People were already at the meeting place before I arrived with Brian Bewsher, a Devon Moth Group and Butterfly Conservation Devon Branch member who lived nearby. There were 7 people present for the Meeting and I took Colin Hart's equipment and my own to the edge of the small wood in my Land Rover; Colin Hart ran his lights up into the wood and I placed mine along the edge; the wood was made up of mostly sweet chestnut with other deciduous trees mixed in. There were seven traps in all with these being set up with the help of the people present; we started up around 22.00 and species started to come in; again numbers were low. The night was clear and dry with a full moon; the temperature was 14 °C by the time we left. The farmer who allowed us to have the field meeting on his land looked in to see how we were progressing. He was astounded by the range of colour and size of the moths that were in the traps; like many people, he had never seen moth trapping before. Later the list had increased to over 70 species but with none of them in numbers; we finished up with 119 by the time we left at around 02.00 with the best of these: one *Cryptoblabes bistriga* (Haw.); two *Discoloxia blomeri* (Curt.) (blomer's rivulet); several *Angerona prunaria* (L.) (orange moth); one *Parectropis similaria* (Hufn.) (brindled white-spot); several *Eilema sororcula* (Hufn.) (orange footman) and one *Apamea sordens* (Hufn.) (rustic shoulder-knot), an uncommon species in Devon.

Spreyton, near Bow (Treedown Farm), Devon, 1 July 2000

Leader: **Roy McCormick**.—The meeting was being held at the home of Stella and John Narramore. We had 12 people turn up, which included Stella and John and two house guests, by the time we decided to walk round the farm to find out where we were going to put our traps. P. Franghiadi, who had three traps, put his into the orchard; my four were placed by a fairly mature pond and in a recently planted copse of deciduous trees that included willows, aspen and alder; John took my equipment by tractor as my site was a couple of hundred yards away. P. Butter, who had two, put his by the track and behind one of the farm buildings. At around 22.00 the generators were started. The night was clear and dry; although rain had been promised, all we saw was cloud in the distance; the temperature went down to 8 °C quite early on but this recovered to 10 °C by the time we were packing up. Species started to come in, but again we suffered from low numbers and only a slow increase

in the list; by around 23.00 a couple of the people had decided they had seen enough and said their goodnights; they had never been to an event like this and had had a very enjoyable time. The list was creeping up to beyond 60 species and by the time we had decided to pack up—around 01.00—(had the night been better we would have stayed longer) the species count was approaching 100; we were ready to go home around 02.00 and the list stood around 100 with a few micros to be identified; these made the list 107 species with the best of these: four *Euphyia biangulata* (Haw.) (cloaked carpet); one *Eupithecia valerianata* (Hüb.) (valerian pug); one *Apeira syringaria* (L.) (lilac beauty); one *Cleorodes lichenaria* (Hufn.) (brussels lace); one *Cerura vinula* (L.) (puss moth), a surprisingly late male in perfect condition; and one *Melanchra pisi* (L.) (broom moth).

Rushy Meadows SSSI, Kidlington, Oxfordshire, 22 July 2000

Leaders: Paul Waring & Martin Townsend.—After several hot sunny days, the weather turned overcast but remained mild and dry for the daytime session (14.30–17.30 hrs), which was attended by Lawrence Bee (LB), Mike Fox (MF), Matthew Smith (MS) and the co-leaders MT and PW. John Brucker, a local naturalist involved with the site, gave us a valuable insight into the importance of the Meadows for birds before we entered the site with all manner of beating trays, sweep nets, pond nets and inspection trays, pooters and tubes. The evening session commenced at 20.30 hrs and went so well that we did not leave the site until 03.30 hrs, in spite of the cool and initially blustery but dry weather. This session was attended by LB, MT, PW, Susan Clark, Martin Corley, John Hemmings, Angus McCrae and Alec Powell. In addition, we were joined, for dusk only, by seven local boys varying from 10–14 years old, who were playing on bicycles near the site and showed an interest in what we were doing. We supplied them with a net and pots and they spent an hour collecting insects for us to identify and we saw a heron together before they had to return home.

The Rushy Meadows SSSI consists of a series of low-lying agriculturally unimproved alluvial grasslands along the west side of the Oxford Canal by Roundham Lock. Low intensity, traditional management as rough pasture for cattle has produced rich meadow and fen habitats on either side of a small stream which runs through the site. The open areas are bordered by substantial old hedgerows, mainly of common hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa* but also containing large crack willows *Salix fragilis*, field maple *Acer campestre*, guelder-rose *Viburnum opulus*, wayfaring tree *V. lantana*, ash *Fraxinus excelsior*, elder *Sambucus niger* and others. The meadows contain many flowering plants, some of which are now uncommon locally because most of the surrounding fields have been ploughed and fertilized or have been built on to increase local housing and expand an industrial estate. Some of the less common plants recorded on the site include devil's-bit scabious *Succisa pratensis*, marsh valerian *Valeriana dioica*, early marsh orchid *Dactylorhiza incarnata* and water avens *Geum rivale*. When the site was first visited by PW in the mid 1970s, the open ground was dominated by three species of rushes (*Juncus* spp.), hence the local name for the site, which is actually Rushy Moors, although it is given as Rushy Meadows on the SSSI notification document. In winter it was wet and marshy and in the spring two or three pairs of breeding snipe (*Gallinago gallinago*) could be heard “drumming” over the site every year. The farm manager, Mr Jefferies, used to graze six to eight head of cattle on the site for part of every year, alternating them onto better adjacent grazing by PW's family home at Park Farm House at other times. In addition, he would mow one or two extensive



Figure 1. Matthew Smith examining sample of freshwater fauna, photo. P. Waring.

patches in the sward in the summer in an attempt to check the growth of the rushes and provide a better grazing of herbs and grasses. These patches were cut on an *ad hoc* basis and were never a large proportion of the overall site, but added diversity and kept some parts of the sward shorter and less rank than others. This management regime was still in place in the mid 1980s, after which Mr Jefferies died and the cattle-grazing ceased. Since then the sward has become increasingly tall and rank and the snipe have stopped breeding, though they still visit during the winter. In 1999 English Nature embarked on a five-year management agreement with the site owner and new stock-proof fences were installed. Cattle-grazing was resumed in the spring of 2000. On this field meeting we found the meadowsweet *Filipendula ulmaria* in full flower and covering most of the open ground (Fig. 1). Greater willowherb *Epilobium hirsutum* was also extremely plentiful while rushes were no longer the predominant plant in the sward. The ground was dry and hard all over the site except on the edges of the stream. We found six Dexter cattle present. They had flattened small areas in the lee of streamside sallow bushes and in other places, which were useful as sites for moth traps, but otherwise the cattle did not appear to have made much of an impact on the sward so far.

The main aims of the field meeting were to update and add to the lists of Lepidoptera and other invertebrates known from the site, most of which were produced by PW in the early 1980s. A particular aim of the daytime session was to see if the white-legged damselfly *Platynemis pennipes* (Pallas) still occurred on the site. This insect is locally distributed in well-vegetated slow-moving lowland streams, rivers and canals in parts of southern England and eastern Wales. It is considered vulnerable both to water pollution and clearance of streamside vegetation (Brooks & Lewington, 1997). PW first discovered the white-legged damselfly on the Rushy Meadows on 17.vii.1982 when several were seen near the stream but none by the canal. In the summer of 1985 the stream was cleared out by the Thames Water



Figure 2. Rushy Meadows, photo. P. Waring 22 July 2000.

Authority who had offered to sow the banks with rye-grass! It had last been dredged and shored up about seven years previously. PW made a return visit on 31.vii.1986 and saw four males of this damselfly, confirming that it had survived the dredging, but then on 28.viii.1986 there was an instance of diesel run-off from the adjacent industrial estate into the stream. Because of these events and the possibility of others of a similar nature in the interim, searching for the damselfly and assessing the water quality and vegetation along the stream were top priorities.

A major aim of the night-time session was to see if we could find a suite of moths previously recorded from the site by PW in the 1980s, including the garden tiger *Arctia caja* (L.), round-winged muslin *Thumatha senex* (Hbn.), blackneck *Lygephila pastinum* (Treit.), gothic *Naenia typica* (L.) and old lady *Mormo maura* (L.). The garden tiger has suffered a substantial decline in some parts of Britain during the last twenty years. It remains abundant in many areas near the coast. On the week of the meeting PW's brother Silas Waring had just returned from the Isles of Scilly and the Penzance area of Cornwall, where he had seen fully grown larvae on a frequent basis in June 2000, usually running across roads. I (PW) have found larvae frequent north to Lindisfarne, Northumberland, in recent years. I see adults in light-traps annually on my travels, but usually only one or two per trap nowadays. I have found them to be more frequent in fens such as Woodwalton Fen than in many other inland habitats (see Waring, 1990) so I was hopeful of seeing them on the Rushy Meadows, where I had previously trapped an adult in an actinic trap on 17.vii.1982. During a visit with Robin Edwards on 24.vi.1984, Robin found a full-grown larva of the garden tiger on the canal towpath near the Rushy Meadows. I considered the garden tiger well established in the area at that time. I recorded the adult moth annually at Park Farm House, adjacent to Rushy Meadows, when I operated a Robinson trap there all night several times per week from 1976–1979 and from 1982–1986, capturing as many as seven per trap-night (19.vii.1982). The maximum in my last full trapping year there, 1986, was four in one night (25.vii.1986).

24.vi.1984 also produced a memorable evening session on the Rushy Meadows for it was then that Robin Edwards and I discovered a population of the blackneck moth there. Five individuals, in fresh condition, were seen on the wing at dusk.

We began the BENHS day-time session by establishing a base at the centre of the site on the bridge over the stream, at grid reference SP 48152 14197 according to MS's global positioning system.

We had only been on the site for a few minutes when MT called out from a stand of willowherb that he had netted what might be "that damselfly" and we all raced over to see it. It proved to be a fine teneral individual with the characteristic legs of *P. pennipes*. This was a great start to the day. The insect was released where found. Later PW found and filmed a mature sky-blue male in fresh condition. Probably we were at the start of the flight period. MS examined the contents of the stream with his pond net and found that the three-spined stickleback (*Gasterosteus aculeatus*) was frequent, including many youngsters. Several species of operculate snails and water beetles were found, indicating that the water quality was quite good. The freshwater shrimp *Gammarus pulex* (L.) and the water slater *Asellus aquaticus* (L.) were abundant.

MF investigated the ant fauna of the site and was particularly pleased to find a nest of the jet-black ant *Lasius fuliginosus* in the base on an old oak tree in the hedge between the Rushy Meadows and the canal. Winged males and females were present and the colony was a strong one with many workers in the leaf litter and on the trunks of the trees in the vicinity. MF commented that he does not often come across this species. The common black ant *Lasius niger* was nesting on dry raised ground by the bridge over the stream in the centre of the site, but was not seen on the rest of the site; probably it is too damp for them. The other ant records for the day were three species of red ants, *Myrmica rubra*, *M. ruginodis* and *M. scabrinodis*. All three were equally abundant and it seemed that almost every grass tussock examined housed a nest of one of these species or another. *M. rubra* was also found nesting under dead wood at the edge of the Meadows.

LB collected a number of spider species for later identification. His sweep-net samples also contained familiar species such as the comb-footed spider *Enoplognatha ovata* (Clerck) and the garden orb-web spider *Araneus diadematus* Clerck.

A young kestrel (*Falco tinnunculus*), capable of flight but still begging food from a parent, flew into the canopy of one of the turkey oaks by the canal, suggesting breeding took place on the site. We walked along the canal towpath, hoping to see a water vole *Arvicola terrestris*, which was a reliable occurrence on this stretch of the canal in the 1970s. None was seen, but I did see one swimming across the canal 1 km to the south on 13.viii.2000. The banks of the canal by the Rushy Meadows are now all shored up with wooden and metal reinforcing plates and the opportunities for water voles burrowing into the banks and having burrow entrances leading straight into the water have been completely removed. We watched a moorhen (*Gallinula chloropus*) with two half-grown chicks feeding by the far bank of the canal.

There were few butterflies on the wing, partly due to the rather overcast conditions. However, two or three marbled whites *Melanargia galathea* (L.) were recorded in the centre of the Meadows. This is not a species I recorded in July–August 1982, when I visited the site on a number of occasions. The other species seen during the meeting included meadow brown *Maniola jurtina* (L.), gatekeeper *Pyronia tithonus* (L.), speckled wood *Pararge aegeria* (L.), green-veined white *Pieris napi* (L.), large skipper *Ochlodes venata* (B. & G.), small skipper *Thymelicus sylvestris* (Poda) and confirmed essex skipper *T. lineola* (Ochs.).

Two cocoons and a somewhat worn adult of the narrow-bordered five-spot burnet *Zygaena lonicerae* (Sch.) were seen during the afternoon.

MT and I beat the crack willows, sallows and blackthorn for moth larvae, but the date was between the two peaks of larval abundance on these plants and we had only a small larva of the clouded border *Lomaspilis marginata* (L.) from the *Salix* spp. and only penultimate instar larvae of the clouded silver *Lomographa temerata* (D. & S.) from the blackthorn.

We took a break at 17.30 hrs for a meal and to collect light-trapping gear. In the evening we set up four Robinson-pattern light-traps and one MV light on a tripod over a sheet. The temperature at dusk was 14°C and the wind dropped to almost nothing as the night progressed. We kept a watch out for a barn owl *Tyto alba* which John Brucker had mentioned often hunted over the rough swards by the canal, but we failed to see it. The first light-trap had only been operating a few minutes when it flew a blackneck. I was pleased to see that this species was still on the wing. We had noted 5 or 6 by the end of the session. That we saw several at such a late date is probably indicative that the population remains large. We certainly saw a fair amount of the larval foodplant tufted vetch *Vicia cracca* L. Moths arrived steadily throughout the night, including species often plentiful in damp ground such as the dingy footman *Eilema griseola* (Hbn.), drinker moth *Euthrix potatoria*, lesser cream wave *Scopula immutata* (L.), large twin-spot carpet *Xanthorhoe quadrifasciata* (Clerck) and then the first of several round-winged muslin moths arrived at about 23.30 hrs. This was followed by three fresh crescent *Celaena leucostigma* (Hbn.) just as a fox (*Vulpes vulpes*) began shouting behind one of the traps and a young long-eared owl (*Asio otus*) flew from one crack willow to another, calling out with the typical squeaky gate sound.

Eventually, at 01.20 hrs, a garden tiger flew in to one of the lights, followed by two more shortly thereafter. This species seldom arrives before midnight and we knew we would have to wait for it. It was great to see this gaudy moth actively flying round the light, onto the sheet and clambering around the egg-tray liners of the light trap. Interestingly, all three garden tigers were trapped at the centre of the site near the stream. Had we only operated the two traps we set on the edge of the site, in easiest access of the towpath, we would have failed to record this species. Other moths to the lights included the pinion-streaked snout *Schrankia costaestrigalis* (Steph.), muslin footman *Nudaria mundana* (L.), leopard moth *Zeuzera pyrina* (L.), dark umber *Philereme transversata* (Hufn.) and, just before we packed up, a gothic arrived. We estimated that there were about 200–300 macro-moths per trap by this time. The total list of macro-moths for the meeting was 95 species.

Forty-four species of Microlepidoptera were recorded, mainly by Martin Corley and Martin Townsend, of which the most noteworthy were the tortricids *Phalonidia manniana* (FvR) (a wetland species which feeds on gipsywort *Lycopus europaeus* and water mint *Mentha aquatica*) and *Hysterosia inopiana* (Haw.) (local on fleabane *Pulicaria dysenterica* Bernh.), the coleophorid *Coleophora glaucolella* Wood (common on *Juncus* rushes) and the pyralid *Eudonia pallida* (Curtis) (an apparently widespread species of marshes, fens and bogs; foodplant possibly mosses or lichens; Martin Corley recorded 8 in his light-trap but has only seen the species once before in Oxfordshire, in Waterperry Wood). A single fresh *Sitochroa palealis* (D. & S.) (Pyralidae) was probably a wanderer from adjacent habitat because it is dependent on wild carrot *Daucus carota* L. which is not a feature of this site.

Unfortunately, due to some confusion, the wine-ropes we had intended to lure the old lady failed to arrive. Another job for next year.

The leaders would like to thank all participants for making this such an enjoyable, varied and productive field meeting, and English Nature for arranging access permission and restoration management.

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Bentley Wood, Wiltshire, 19 August 2000

Leader: **Tony Pickles**.—This field meeting was arranged with the help of David Brown, the agent, and Olly Howells the newly appointed warden for Bentley Wood, to whom I express my thanks. Extensive moth recording has been undertaken in this well known locality for the purple emperor *Apatura iris* (L.) and many other butterflies, and this has been summarised by B. W. Fox and P. Waring (*Entomologist's Gazette* **50**: 261–279). The purpose of the meeting was to continue this recording work and provide some current information for specific areas of the wood prior to certain thinning and felling operations. It was hoped that the information provided would be of use in monitoring any changes to fauna resulting from this work.

In the event these ambitions were somewhat thwarted by a disappointingly low turnout of members and indifferent weather. Six of us operated MV and kept records of Lepidoptera specific to the various traps, but no species of 'macro' which was not already well known from the wood was uncovered, and only common 'micros' were seen. The species list submitted to Mr Howells and lodged with Dinton Pastures totalled just seventy. On a more positive note it is expected that some of the members who attended will respond to the invitation to continue to record moths here.

THE BRITISH ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY RESEARCH FUND

The Society invites applications for grants, from its Research Fund, to be awarded in December 2001. Awards are open to both members and non-members of the BENHS and will be made to support research on insects and spiders with reference to the British fauna, and with emphasis on:

- (a) the assistance of fieldwork on insects with relevance to their conservation,
- (b) work leading to the production of identification guides and distribution lists.

Travel to examine museum collections and to consult taxonomic specialists would be included. The work and travel is not limited to the British Isles but must have a demonstrable relevance to the British insect or spider fauna. Preference will be given to work with a clear final objective (e.g., leading to publication or the production of a habitat management plan). Work on leaf miners and gall forming insects should be submitted to the Society's Professor Hering Memorial Research Fund.

Individual grants are unlikely to exceed £500 and applications for smaller sums are particularly welcome.

Applicants should send seven copies, if possible (one copy if the application is for less than £100), of their plan of work, the precise objectives, the amount for which an award is requested and a brief statement outlining their experience in this area of work, to Dr J. Muggleton, 30 Penton Road, Staines, Middx, TW18 2LD, as soon as possible and not later than 30 September 2001. Further information may be obtained from the same address (email: jmuggleton@compuserve.com).

THE PROFESSOR HERING MEMORIAL RESEARCH FUND

The British Entomological and Natural History Society announces that awards may be made from this Fund for the promotion of entomological research with particular emphasis on:

- (a) leaf-miners
- (b) Diptera, particularly Tephritidae and Agromyzidae
- (c) Lepidoptera, particularly Microlepidoptera
- (d) general entomology

in the above order of preference having regard to the suitability of applicants and the plan of work proposed.

Awards may be made to assist travelling and other expenses necessary for fieldwork, for the study of collections, for attendance at conferences, or, exceptionally, for the costs of publication of finished work. In total they are unlikely to exceed £1000 in the year 2002.

Applicants should send six copies, if possible, of a statement of their qualifications, of their plan of work, and of the precise objects and amount for which an award is sought, to Dr M. J. Scoble, Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK as soon as possible and not later than 30 September 2001.

Applications are also invited from persons wishing to borrow the Wild M3 Stereomicroscope and fibre optics illuminator bequeathed to the Fund by the late Edward Pelham-Clinton, 10th Duke of Newcastle. Loan of this equipment will be made for a period of up to six months in the first instance.

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